

# PLASTICS & MOLDED PRODUCTS

Volume 7

DECEMBER 1931

Number 12

## Improved Black and Brown

MOLDERS REPORT GREAT SUCCESS WITH  
QUICK-CURING, FAST-FLOWING, UNIFORM DUREZ

A FEW weeks ago, without so much as a change in code numbers, General Plastics put in production a greatly improved Durez. No public announcement was made. Shipments went out as usual.

### What the molders say

Judging from enthusiastic reports of the molders themselves, no other material has ever acted in the press like Durez 2260 Black and 1438 Brown! We strongly urge any molder who has not yet used these improved materials to try them to prove their superiority for himself.

Durez Black and Brown—which have been constantly improved—have a greater flow than ever before. They have a plasticity which has not been obtainable up to

now without consequent slow cure. From 25 to 50 per cent is cut from curing time. And they have a higher dielectric and structural strength, a greater chemical and water resistance than has ever before been possible with standard materials. They are increasing production and are a definite aid to continuous, rapid molding.

### How Durez cures

One of the most important changes for the better with Durez Black and Brown is the curing time. As a test, improved Durez and a competitive material were placed in a press molding identical pieces. Durez cured in a two-minute cycle, giving a fine finish and a very thin fin. The competitive material barely cured with a cycle twice as long!

Molders will find Durez ideally suited to pieces that require a high finish. The surface has a smooth and lustrous sheen, brilliant as ebony. Yet, with all these improvements, there is no increase in price! . . . We shall be glad to go into further details about Durez, and discuss any phase of molding involving its use. Write now for information and free samples to General Plastics, Inc., 212 Walck Road, North Tonawanda, New York. Also New York, Chicago, San Francisco, Los Angeles. The makers of Durez are also the makers of Durez Insulating Varnishes.



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# PLASTICS & MOLDED PRODUCTS

Reg. U. S. Pat. Off.

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EVERY process industry—and this is one of them—is measured by its mechanical progress. The machine must set the pace for the product. While we believe that this Industry is over equipped, yet we also believe, paradoxically, that it is under equipped for modern production. So much of the machinery now in use is obsolete, ill-suited for several types of jobs, patched together by workmen who should devote their time to productive labor. Careless temperature control, unrecorded pressures, cycles gauged by a cheap watch that lacks a second hand—we have seen these practices spoil many a good product. Yes, the need exists; does the equipment exist to cure it? The answer lies in the articles in this issue, many of them written from the users' standpoint, all of them showing that up-to-date machinery is a necessary investment. The operators in your plant will be interested in this number, eager to see how they can economically increase their earnings—and yours! Pass it along!

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# PLASTICS & MOLDED PRODUCTS

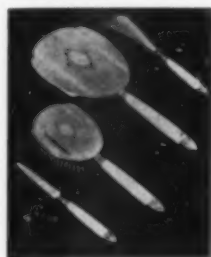
Reg. U. S. Pat. Off.

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The Plastics Industry is always an essential source of supply to Santa Claus. This year the variety of articles produced by the industry for the Christmas gift trade is as numerous as ever but, in addition, a note of wider usefulness and more pleasing design is certainly apparent. Every member of the family can be presented with a plastic-fabricated gift, but as usual, first the ladies:—



Toiletware sets are a traditional Christmas gift and plastics have long contributed to their acceptability. The set on the left is the new Victoire pattern of International Silver Company fitted with luxuriant, ivory Beetle molded handles. On the left is the new medium-priced Belle Fleur pattern of DuPont Viscoloid Co. executed in Lucite, a pyroxylin plastic. Either set would grace milady's dressing table.



The big men in the family would be pleased to accept any of the resinoid molded products below. Norton Laboratories mold, out of Durez, the cigarette boxes on the left. Colors are black-and-scarlet, walnut and mahogany. Snap-on covers form a tight seal. The Schick Dry Shaver, in the center, requires no lather, blades or effort. Molded Bakelite provides a handsome case. Another product that employs Bakelite molded is the device, on the right, that dispenses lighted cigarettes, all ready to smoke, by simply pressing back the little door.



The traditional Christmas gift for children is a toy but the plastics industry provides articles of utility, handsomely dressed up.

The Beetleware Corporation distributes these luncheon boxes in a variety of pastel shades. The handle is firmly imbedded in the plastic material. It is much more attractive than the old-fashioned black, enameled tin box.



Richardson Co., Melrose Park, Ill., mold and merchandise these children's partition plate and tumbler sets, the plate being in the form of a turtle. Youngsters can't resist spinach offered in this delightful dish, molded in pastel-colored Plaskon.

Synthetic Plastic Materials are capable of molding and fabrication in a multitude of shapes and an infinite variety of colors. Physical characteristics of the various materials differ widely in many cases so that they can be applied to innumerable uses to meet various specifications.

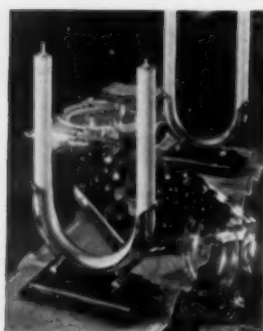
**P**LASTIC products in the holiday mood are assuredly not restricted to the personal gift type. Those who wish to grace the home or office with useful accessories need not go outside the plastic field to satisfy good taste and sound judgment in their choice.



A new instantaneous hot water heater, handy in home or office, uses molded plastics in a most essential part. A soft rubber device permits the faucet to be inserted without fuss or adjusting, gripping tightly without leaking. The conical case, available in a variety of colors, is molded of lustrous, easily-cleaned, Durez. The heater delivers two quarts of hot water per minute.



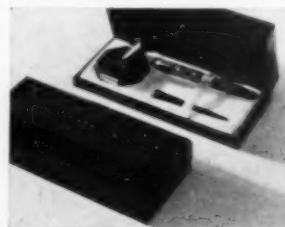
Kurz-Kasch Company are molding these new all-plastic rouge compacts. Material used is Beetle and a variety of pleasing pastel shades are used in production. Helena Rubinstein, Inc., manufacturers of beauty preparations, are using the black and red combination for packaging their product.



These modernistic candles will not only light the Christmas dinner table but will also add a new decorative note. The bases harmonize with the modern tone of the candles, being molded of black Bakelite, the trim being chromium. Being up to the minute it can even give the lie to the old adage by burning the candles at both ends.

**1**932 Automobile Shows are in the offing and a number of new models, some available for Christmas gifts, will be fitted with molded plastic knobs and trim.

Parker Pen packages a new gift set in a molded Durez box. The color scheme is gold and black, with fine lines and initial lending a note of richness with restraint. A desk pen-holder is included and the entire box can be used as a permanent container for the home or office desk. Of special interest is the spring hinge, developed by Norton Laboratories, which is invisible when the box is closed.



In this modern age, time savers are a great asset. However, the mere saving of time alone does not satisfy the perfect hostess. An egg-slicer must be more than a mere mechanical device. It cannot be ugly and it must harmonize with the decorative scheme of the entire setting. This egg slicer has a base of orange Bakelite molded, metal parts chromium plated.



The European plastics industry, too, is a figure in the Christmas gift market. The pitcher on the right holds a thermos bottle. It is molded out of white Pollopas made by the Rheinisch-Westfaelische Sprengstoff A. G. It is an interesting example of art and design in plastic molding. Photograph by courtesy of the Synthetic Plastics Co., Inc.



**A**ND so closes another spread of cheer from the plants of the plastic industry. *Plastics & Molded Products* joins the manufacturers of these products in wishing all the users of these products a very Merry Christmas.

# Profits From Sound Prices Must Pay For Machinery and Equipment

By John J. Quigley

Certified Public Accountant

**I**N an era of industrial depression when greatest pressure is exerted by buyers with a consequent lowering of prices, the question of a fair return on cost is one that vitally concerns both buyers and sellers and also the consumer public, for if the producers of needful articles do not receive a return that will permit them to serve for a profit, with a margin for reserve as security, they cannot continue to act and must eventually cease to produce.

At a meeting of the Chamber of Commerce of the United States in the spring of 1924 some fifteen "Principles of Business Conduct" were adopted. The Preamble to this resolution is quoted in full in the following paragraph:

"The function of business is to provide for the material needs of mankind and to increase the wealth of the world and the value and happiness of life. In order to perform its functions it must offer a sufficient opportunity for gain to compensate individuals who assume its risks, but the motives which lead individuals to engage in business must not be confused with the functions of business itself. When business enterprise is successfully carried on with constant and efficient endeavor to reduce the cost of production and distribution, to improve the quality of the products and to give fair treatment to customers, capital, management and labor, it renders public service of the highest value."

To economically and efficiently supply the users of molded parts with their material requirements, the molders of plastic materials have made heavy

capital expenditures as investments in Machinery, Auxiliary Equipment, and Molds; and the trend toward still higher-duty presses and multiple cavity molds is well illustrated in the feature articles in this issue of **Plastics**. The importance of replacement and maintenance expenditures for Machinery and Molds, as items of cost of production, is frequently overlooked and it is only when additional capital outlay must be made to keep abreast of the development of more efficient equipment that this matter receives proper consideration. These maintenance and replacement expenditures are continuing expenses and must be met by a charge to production, or the capital structure of the business will become so topheavy as to absorb all or too much of the liquid capital.

## Selling Prices Must Contain Charge for Replacements

Merely to charge off through Reserves for Depreciation the allowable amounts set by the Treasury Department for Federal Income Taxation does not suffice, for if the wasting of assets through obsolescence is not recovered through the margin of selling price over actual cost, the business does not have a reserve or surplus with which to meet these capital outlays.

I have examined the records of several representative molders of plastics whose combined capital outlay for Buildings, Machinery and Equipment, and Molds is in excess of \$1,650,000.00. In the years 1928, 1929 and 1930, the aggregate profits of these companies, returned a net of about 2% for the three



years on total invested capital. I do not need to point out that this return is less than the amount paid annually by Savings Banks, and much less than the annual yield of a safe Government or industrial bond.

If "in order to perform its functions, business must offer a sufficient opportunity for gain to compensate individuals who assume its risks", it follows that the selling price of an article must include all of the elements that make up its cost of production plus a fair return as profit. In estimating the price of a molded piece the maintenance cost of the mold and the maintenance and depreciation allowance on presses and auxiliary equipment must be included. In my opinion this latter should not be calculated as a part of general factory overhead, but should be a definite addition to cost based on cost records which disclose the maintenance cost of the particular

(Continued on page 690)

# Mold Construction Methods

By L. S. Gleason

General Electric Company

**T**HE design and building of tools is becoming increasingly important in the molded products industry, and a very essential part of this work necessarily falls upon the machine tools used. It is to the advantage of every tool room foreman to equip his department with adequate machine tools of the latest designs for turning out work efficiently and at a low cost.

There are at present, several concerns manufacturing machine tools of different designs for tool room work, and it is possible for the most exacting purchaser to find machine tools for his particular requirements without a great deal of difficulty. The following example illustrates the distinct advancement that has been made in the field of spacing and boring holes in all lines of tool work.

As recently as 1925, it was standard practice to prepare holes for boring by the button method. This method consisted of laying out the part to be bored with a square and scribe or a height gage. A hole was then drilled and tapped at the approximate location desired. Next, the button was fastened in position by means of a screw, and accurately located with either a height gage or micrometers and parallels. The work was then taken to a machine, a lathe, milling machine or a drill press, and the button located centrally with the spindle by means of an indicator, after which it was ready to be drilled and bored.

The modern operation is to use a jig boring machine, locating the work on the table and

by means of accurate measuring instruments (which are part of the machine) locate the work quickly in the desired position to be drilled and bored. This method is a distinct money saver over the old method and is also more accurate.

## Milling

Tool work, and especially mold making, requires a large amount of vertical milling. The standard milling machines with vertical milling attachments have been superseded for small and intricate work by vertical mills or profiling machines which have the necessarily higher spindle speeds and sensitiveness so essential when end mills of from 3/64" diameter up to 1/2" diameter are used. These machine tools when equipped with rotary tables and angular vises, form a unit that permits the handling of a large range of work both speedily and economically. Supplementing the standard line of vertical mills or profilers is another modern machine which is helping to cut costs and increase output. This is a semi-

automatic milling, profiling and boring machine electrically controlled. This machine is doing work which would ordinarily be done in vertical mills, at a very substantial reduction in cost. Other machine tools such as lathes, shapers, grinders, etc., are all very important and should be of modern design to get the maximum production at a reduced cost. A new series of air tools such as chisels, filers and grinders has been recently brought out which are very valuable in the mold construction.

In the field of thread cutting, an important step forward has been taken by the introduction of thread milling machine tools.

Figure 1, below, shows a hob, hobbled mold and the resultant molded part which gives an idea of the difficulties encountered if the cavity were milled.

Figure 2, right, shows a complete multi-cavity mold in which each cavity was produced with a master hob.

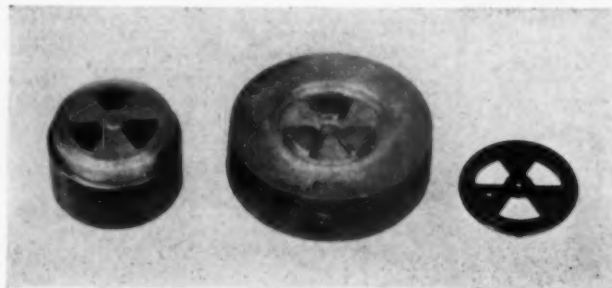


Fig. 2

Fig. 1

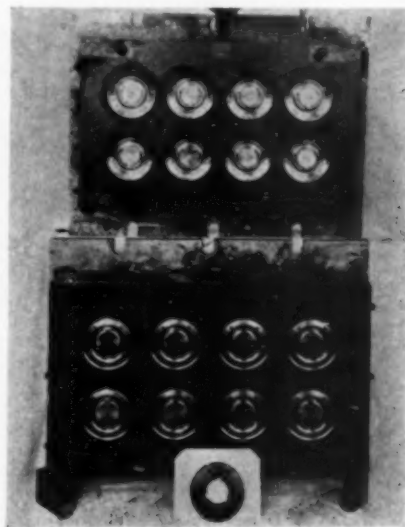


Fig. 4

Fig. 3

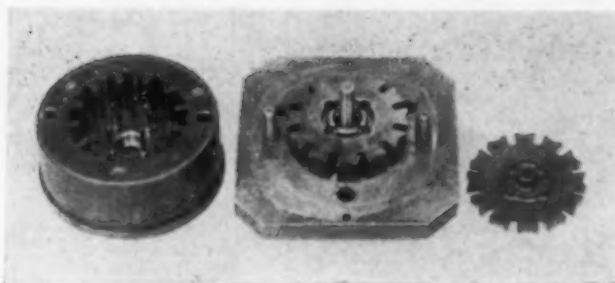
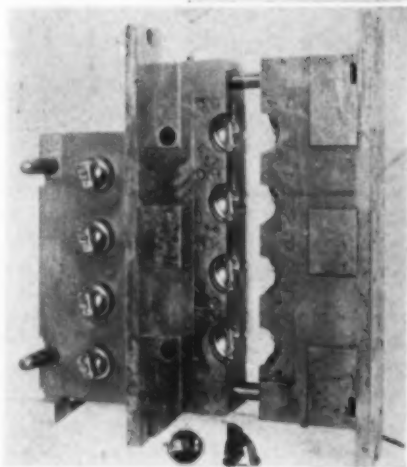


Figure 3, left, shows a mold for a part having difficult outside and inside contours. Modern machine tools and methods permit operations that are far less laborious and expensive than older methods for this construction.

Figure 4, above, shows a mold that illustrates the value of the semi-automatic milling, boring and profiling machine. By conventional methods, both plunger and cavity would require a multiplicity of set-ups. Just one set-up, and a readily made brass template are required in the new machine.



The old method of cutting threads (to be used in a mold) on a lathe is both costly and not entirely satisfactory. The thread milling machine is handling this class of work to good advantage as the threads can be milled faster, more accurately and with a better finish than can be accomplished on the lathe.

### Die Hobbing

One of the outstanding developments in the construction of molds is that known as hobbing. By this method or process, a hardened steel master representing the outside shape of the part to be produced from the mold, is pressed into a soft steel blank by hydraulic pressure of from three to ten thousand tons, depending upon the size and shape of the blank to be hobbled. The hob is then withdrawn leaving an imprint in the steel which if machined by conventional methods, would be very difficult to realize, and in a majority of cases, prohibitive as to cost. This method, while it had been practiced more or less for a good many years on simple parts, did not become developed to the present high

standard until the manufacturer of hot molded products required a cheaper and better way of building molds. Figure (1) shows a hob, hobbing and the resultant molded part which will give an idea of the difficulties that would be encountered if the cavity had been machined, especially if a number of them were required. Figure (2) shows a complete multicavity mold in which the cavities were manufactured by the hobbing process.

Mold construction and design vary somewhat in different molding concerns due to available press equipment, but generally speaking, there are two types, namely, hand molds and automatic molds. These two types are commonly divided into three divisions, namely, positive flash molds, plunger molds and loading plate molds. Figure (3) shows a difficult job of molding made comparatively simple by the correct design of mold for the job. This part combines the difficult outside and inside contours with inserts and molded threads. The design of mold necessarily had to be such that ease of operation could be had as well as simplicity of construction. The mold represents the plunger mold design together with provision for splitting the cavities in order to eject the finished parts. The external and internal threads

are formed by a loose ring and plug. This mold represents what can be done with modern machine tools and methods and while it still presents by no means a simple problem, yet it is much easier and less costly to build than by less modern methods and equipment. Figure (4) shows a mold and molding that illustrates the value of the electrically controlled semi-automatic milling, profiling and boring machine for the building of molding tools. This particular part, if machined in the conventional way, would have required a multiplicity of setups for both the cavity and plunger. However, a brass template was made from  $\frac{1}{8}$ " stock at a very little cost which enabled the mold to be completed in the above machine at one setup with a small allowance for filing. A separate template was necessary for machining the plungers, but the cost of these templates was saved many times over on the total cost of the mold.

### Design

The designing of molds is very important if a good as well as an inexpensive product is desired. The designer must keep in mind various items such as press equipment, pressure required, heating, strength of pins and projections, shrinkage, compounds to be used, etc. To be able to design molds to the best advantage, the designer should be thoroughly familiar with actual molding practice as well as the latest tool room procedure.

Since the correct design and manufacture of molds is the vital factor in the production of molded parts, and because the cost of tools is an important part of the total expenditure for any molding job, it is the urgent necessity of machine tool builders, tool room operators and molders to combine their knowledge and experience with the objective of producing better molds at a lower cost.

# Time and Temperature Control In Plastic Molding

By C. W. Blount

Sales Engineer, Bakelite Corporation

**M**ANY molders have taken molding time and temperatures as a matter of course, simply accepting existing conditions as standard. They are likely to overlook the fact that the materials we are dealing with are **Heat Reactive**, and hence too high, or too low a temperature may speed up or slow down the reaction to the detriment of and loss to the molder. For that reason in this article temperature control will be discussed first.

## Temperature Effects

The temperature at which a mold is operated makes all the difference sometimes between success and failure. Different jobs using the same material could be run in production more efficiently at different temperatures. In a molding plant recently, on a long flow job, a material which worked perfectly on general production would not fill out and blistered badly running at 330° F. The temperature was lowered to 300°F, the piece not only filled out but the mold closed with less pressure and blisters were eliminated. On another job where a relatively difficult molding, shock-resistant material was being run, satisfactory production was had, by a corresponding reduction in temperature. On the other hand, on many jobs, higher temperatures shorten cycles. The tendency today in the field, however, is to err on the high side believing the higher the temperature used the quicker the reaction, which is true; second, to shorten the molding cycle, which we have found to be far from the case. The size and thickness of the piece and the required flow determine the best molding temperatures.

As most plants are relying on steam as a heating medium, the reducing valve is the obvious solution to temperature control. It is necessary to **trap separately** a press or presses operating under reduced steam. There are satisfactory reducing valves on the market and they are successfully being used in many instances. The producer who has to mold black, brilliant colors, light colors, and different types of materials will find the installation of one or more reducing valves on his presses will more than pay for themselves in a relatively short time in raising quality and quantity of production. Several colored molding materials which show bad dis-

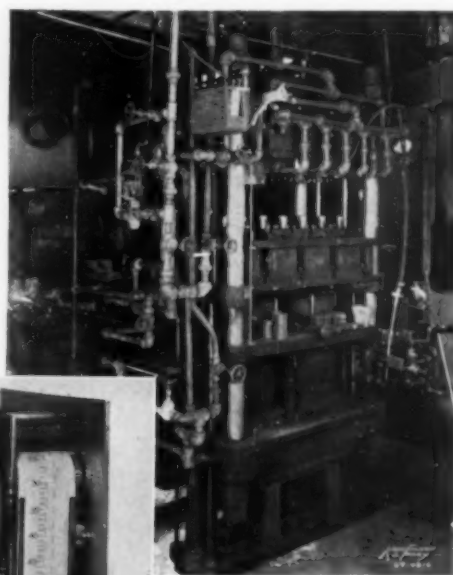
coloration at 320°-350°F. yield beautiful pieces at 270°F. This is just as true of phenol resin materials as the urea types. By properly controlling temperatures, cycles have been shortened 25%. It should be borne in mind that in reducing temperatures for molding light colors chemical resistance is somewhat lessened.

## Platen Temperature Control

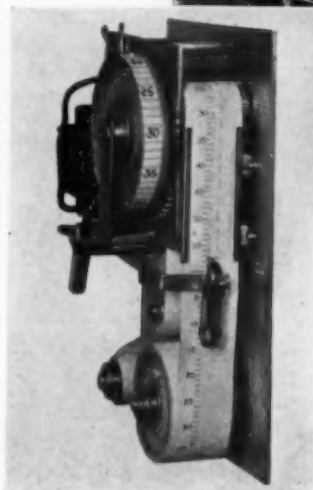
The shop operating with gas and electricity heated presses can procure greatly improved apparatus in the form of thermocouples for controlling the temperature of platens. Such

(Continued on page 693)

Semi-automatic molding press equipped with Signal-Graph set to record preheat, press and cooling time cycles. Meter also operates colored lights to guide operator.



Signal-Graph with cover removed showing recording strip and timing wheel for any cycle up to 55 minutes.



Photos Courtesy of Production Meter Service Corporation.

# Bates Scores New Sales With Molded Numbering Machine Parts

By S. M. Babson

Sales Manager, Bates Manufacturing Company

FOR many years the use of numbering machines has been growing steadily. Today it would be difficult to find a busy office where one or more of these devices is not used. Comparable with this expansion in the uses of this product, has been the increasing requirements which numbering machines have been called upon to perform. These developments have taken form in various ways:

The machines themselves have been amplified for greater capacity, the addition of wheels and symbols and dates in connection with the number, and the addition of die-plates for printing various wording in connection with the number or date, larger

and bulkier machines for more severe use, and greater adjustability for the desired information to be printed.

All these have tended to add weight and bulk to numbering machines. Naturally this increased size has also increased weight, and as weight is increased in many cases the operation of the machine has become more burdensome rather than the reverse. How to preserve the speed and lightness of action in the numbering machine to make it easier for the operator to use and yet to permit of these developments, has been a problem.

To lighten or weaken any of the parts in the machine would have been a step in the wrong direction, since the requirements

of numbering machines have grown steadily more severe. There are many departments in railroad offices and in the governmental departments, both Federal and State, where numbering machines are used continuously day and night with never any interruption.

It is not uncommon to find numbering machines numbering as much as fifteen or twenty thousand impressions per day. Assuming the weight of the machine to be approximately 11½ lbs., one operator making 10,000 impressions per day would lift the equivalent of 11½ tons, admittedly a very fatiguing day's work. Since type of work is carried on by young men or young women, it has become particularly desirable to furnish machines wherein this burden can be cut down.

## A Lighter Frame

The Bates Manufacturing Company, the world's largest maker of numbering machines, have recently solved this problem by the application of Bakelite in the heaviest part of the machine, that is the frame. Another part has been lightened by the use of hardened duraluminum, with the net result of a reduction in weight per machine from 22½ ounces to 13 ounces, almost one-half. At first it was felt that this substitution of Bakelite for steel might result in a skepticism on the part of the trade with regard to the strength of the product. This has been met in two ways; First, by the reinforcing of the Bakelite with brass cores and in-



One of the Bates Manufacturing Company's line of Numbering Machines with light but strong and durable molded Bakelite frame and knob.

(Continued on page 694)

# The Use of the Banbury Mixer In Plastics Manufacture

By C. F. Schnuck

*Division Engineer, Farrel-Birmingham Co., Inc.*

**T**HE manufacture of some forms of phenol plastics, phonograph record stock and other compounds of similar physical characteristics, requires the conversion of a dust into a plastic form, at the same time insuring a perfect homogeneity. In order to accomplish this it is necessary to soften some of the ingredients by the application of heat, at the same time diffusing them uniformly throughout the mass.

This operation, while possible of accomplishment on a roll mill, nevertheless leaves something to be desired, since the free portions of the batch are not under control and rise in the air, making disagreeable and dusty conditions around the mill. The Banbury Mixer, being considered for this work, was found to lend itself very well to the retention of the batch in a form to be continuously acted upon without the troublesome escape of dust, since the Banbury Mixer has a working chamber entirely enclosed and the materials were uniformly acted upon with a smearing and kneading action while being subjected to heat from the walls of the mixing chamber, uniform results being obtained in a surprisingly short mixing time.

Control of temperature best suited for the work is easily maintained by means of steam or other hot circulating media, and by means of this control the batch is quickly softened while the kneading and blending is taking place.

The common practice when handling materials of these general characteristics is to pre-

viously accomplish the approximate compounding in a large tank type of mixer, with a ribbon form of agitation blade so there is a general uniform distribution of the wood flour, carbon black, resin, etc. This operation is performed cold and the material remains in the form of dust, being handled in bulk.

After the preliminary compounding the material is discharged in batch size from a weighing hopper directly into the Banbury Mixer where, in a short time cycle, the principal operation of converting this dust into a uniform plastic is performed. The time cycle varies from three-quarters of a minute to four or five minutes, depending upon the character of compound or work being handled.

After discharging from the Banbury Mixer the material is usually allowed to become firm, then being broken up and cooled on a conveyor, after which it is pulverized preparatory to the moulding operation.

## Batch Sizes And Power

The small Banbury Mixer will receive a charge of approximately 45 or 50 pounds at each operation. This is the size most frequently selected for the manufacture of phenolic resinoid.

The large Banbury Mixer used in making phonograph record stock will receive a batch of 450 to 500 pounds of material.

When determining the proper batch size for any compound it is customary to run a few trial batches to insure that the proper volume has been reached for that particular stock, so as to fill the machine sufficiently to

create the necessary mechanical resistance and yet provide voids for the flow of the material in the mixing chamber.

The power consumption of a small Banbury Mixer when mixing Bakelite averages about 60 H.P., with the rotors operating at a speed of approximately 40 R.P.M. The peaks are not very high and are of extremely short duration, occurring at the instant before melting occurs in the compound.

## Construction

Essentially, the Banbury Mixer consists of an enclosed trough or mixing chamber, in which operate two mixing rotors or blades, a hopper superstructure into which the materials are fed, and a sliding door in the bottom, through which the mixed material is discharged. The blades of the rotors are formed in an interrupted spiral and the rotors are operated at slightly different speeds. Two forms of the machine are available; one with cored mixing chambers and stuffing boxes to permit the application of steam, cooling water or other temperature-controlling fluid; and the other with jackets having powerful sprays of cooling water applied directly to the walls of the mixing chamber to reduce temperature. The type having cored mixing chambers is considered more applicable to the mixing of materials herein discussed.

End thrust adjustments are applied to absorb the slight axial forces developed by the spiral blades, these adjustments being designed for close setting and follow up due to wear. The rotors are provided with dust

PLASTICS & MOLDED PRODUCTS

stops where they emerge from the mixing chamber and are lubricated by force feed. The gears which connect the rotors and provide for the differential rotation operate in an oil bath, as do also the main driving and reduction gears transmitting power and reducing speed from the motor.

For mixing plastics of the type mentioned in the beginning of this article, certain special features were found to be necessary in the Banbury Mixer as against the standard construction of the machine used so widely in the rubber industry, to permit the clean discharge of the batch and prevent its sticking or adhering to the rotors or chamber walls.

Chrome plating of the working surfaces was found to be of considerable help, and it has been found through long experience to adhere satisfactorily and resist wear which might otherwise occur. Chilling of the rotors by cooling circulation has also been of assistance in maintaining them free from stock adherence.

### Operation

Through a maximum transfer of skill to mechanism, the Banbury Mixer eliminates the variability of the human element and increases unit output with signal reductions in labor, power and operating costs. The operation of the Banbury Mixer requires no skill on the part of the operator; simply attention to a prescribed routine.

In operation, materials are

charged into the feeding hopper while the machine is running. No adjustment or changes of the machine are necessary during the process. The mixing is automatic. A timing device, operated by Telechron motor, instructs the operator when to feed the various materials into the machine and when to discharge the batch at the completion of the mixing cycle. In addition to the pointer on the face of the timing clock, signal lamps are flashed at any desired interval during the mixing cycle. Operating instructions are written on the paper dial of the timing device, a different dial being provided for each kind of stock.

The timing device brings a positive control to the operation of the Banbury Mixer, replacing former dependence upon human skill by predetermined standards of procedure and standardized moves for each operation.

More complete automatic operation of the Banbury Mixer can be secured by means of an automatic discharge of the batch upon completion of the mixing cycle. This automatic discharge control operates in connection with the Telechron-operated timing device. When the latter makes the contact upon completion of the mixing cycle, a small motor operates the pneumatic valve controlling the discharge door. The door is compelled to make a full opening stroke, remaining open about four seconds to allow full discharge of the batch and then making a complete closing stroke automatically.

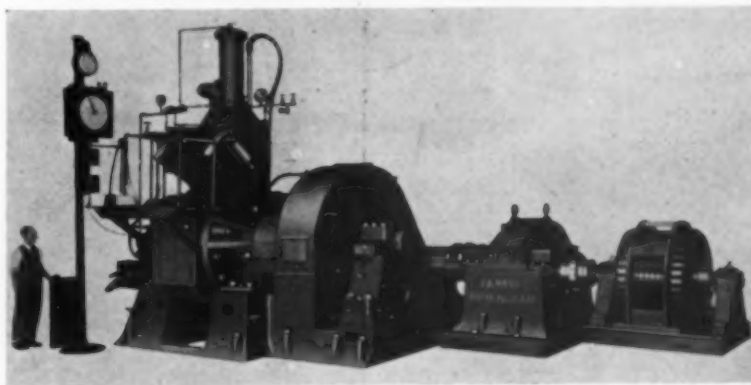
The use of this instrument can also be extended to operate hopper dumps for charging, etc., reducing to a minimum the labor charge for operating the Banbury Mixer.

For the mixing of miscellaneous plastics where the time cycle is sufficiently long to produce a clearly defined chart record, a recording thermometer is provided which records the time and temperature of each successive operation. The resultant chart reveals whether or not the operator has followed the prescribed routine as to temperature at starting and discharging, the interval between batches, and the various steps in the mixing cycle. The recording thermometer chart provides a complete record of the machine's operation and is a positive check upon any deviation on the part of the operator from the routine prescribed on the dial of the timing device.

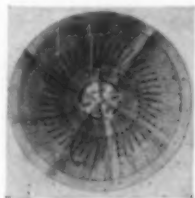
### Application

This machine, while originally developed for the compounding of rubber and similar heavy plastic materials, has been found to lend itself admirably to a great many forms of mixing where it is desired to retain the material in the chamber and apply an intensive mixing or smearing action on a resistant material. The full field has not as yet been developed, since new uses are constantly being found whereby a previously difficult or expensive mixing operation is cheaply and easily done in the Banbury Mixer.

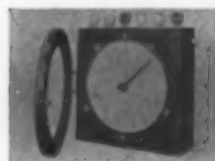
Banbury Mixer with motor drive and full equipment. Recording thermometer and Telechron operated timing device mounted on post adjacent to machine.



Recording thermometer chart showing uniform range of time and temperature over a day's run.



Telechron operated timing device with typical instruction chart. Door open to show contactors which flash signals at any selected stage in mixing cycle.



# Plaskon, a New Molding Compound the Result of Planned Research

*By James L. Rogers,*

*President, Toledo Synthetic Products, Inc.*

*Exclusively Released to **Plastics***



**S**OME years ago there was established at Mellon Institute of Industrial Research at Pittsburgh a fellowship on nitrogenous resins. The first commercial product of this fellowship was offered to the molding industry early this year under the name of Plaskon, a new urea-formaldehyde molding compound that is now being produced in the new and completely equipped plant of Toledo Synthetic Products, Inc., at Toledo, Ohio.

Originally this research was undertaken to obtain a suitable material for a specific purpose, namely, the housings of computing scales for retail stores. It was not until all the then available materials had been thoroughly studied and tested that it was decided that none of them could meet the specified requirements and that something new must be evolved to combine the advantages of several well-known products.

Subsequent scientific research indicated that resins from urea and formaldehyde offered the greatest possibilities for the successful solution of the problem. (The latter may be briefly described as the need for a light, strong, moldable material that must be water-white transparent.) This problem was solved when the desired plastic was produced; but it promptly became apparent that there was also a wide field of application, for a translucent molding material possessing the novel plastic properties which would be available in many shades and colors. Further investigation finally covered this phase, as it had the first, and the result was the product that has now been put on the market as Plaskon.

## **Semi-Commercial Study**

After the test-tube stage of this work had been successfully passed in the laboratory, a pilot plant was constructed at Mellon Institute for the sub-commercial study of production and for the determination of exactly the right type of equipment needed to manufacture the product on a quantity basis. Space will not permit us to describe, nor is the reader interested in, the details of the development of this plant and its processes. Each of the many operations required prolonged and comprehensive study. The infinite pains which were taken, however, were justified when finally a method was evolved for duplicating the laboratory product on a large scale. The next step was the assembling of the machinery to perform commercially the

same tasks which had been accomplished in the laboratory and unit plant. Months of labor eventually reproduced in commercial production the results obtained in the laboratory and with the somewhat unique advantage that the commercial product actually surpassed in quality the product which was made in the laboratory.

One's own judgment is often apt to be unduly unbiased where one's own interest, an only child, so to speak, is concerned. Recognizing the danger of over-enthusiasm, the men interested in the development of this new material went to experienced, practical molders and sought their cooperation, which is here gratefully acknowledged. These specialists frankly gave their opinions as to the merits and defects of the new material. This technical criticism and the examinations of this product which these practical molders made constituted the first real appraisal of the value of the new compound. When Plaskon successfully met these tests, as it soon did in every respect, it was offered to the trade.

## **Color Range**

Plaskon can be briefly described as a heat-reactive urea-formaldehyde resin that is available in a wide range of interesting, attractive, translucent colors, tints, and shades. A table of the physical and electrical properties of "Plaskon" is presented at the end of this article, so that there is no apparent need to discuss them here. Color, a vitally important

**PLASTICS & MOLDED PRODUCTS**

factor, was at first a problem that necessitated broad study. But an artist, of high professional standing, thoroughly versed in color possibilities from his long experience in mixing colors on a palette, was summoned to the aid of the chemists and labored with them, side by side, in the laboratory. With infinite patience, this artist produced over a thousand different colors, from which were chosen nineteen standards for "Plaskon". These are known as Snow White, Ivory, Pale Yellow, Primrose Yellow, Honeydew, Chinese Orange, Tomato Red, Cardinal Red, Pink, Orchid, Pale Blue, Medium Blue, Midnight Blue, French Lilac, Purple, Lettuce Green, Medium Green, Jet Black, and Natural White. In addition to these standard colors, many special colors have been and can be made to match individual requirements of users.

Early in the development stage of Plaskon, it became apparent that, if light molding compounds were to find wide acceptance among molders, it would be necessary, not only that the molded product maintain a uniform high quality, but, equally essential, that the technic of molding be such that the material could be used without unduly complicating present production operations. In the molding industry of today there is too little margin to permit detailed and intricate manipulation of processes that require the employment of many highly-paid men.

### Molding Speed

To be practical and to attain wide use for Plaskon, it was recognized that two goals—simplicity of molding and rapidity of cure—must be attained. It has been demonstrated that there is impressive simplicity in molding with Plaskon. The factor of speed is at present limited only by the type of molding presses in use.

Plaskon is an extremely reac-

tive compound and the most essential step in molding calls for a fairly rapid application of pressure after the material comes in contact with the heated mold. In pieces where a long flow is required, a compromise must be effected. In other words, the mold must not be closed so rapidly that troublesome flow marks, the curse of translucent moldings, will result. In moldings made from fine or granular material and having a long flow, it is usually necessary to open the mold about one-half inch, five to twenty seconds after closing to permit gases and air to escape, closing it again immediately.

### Preforming

Cure time with Plaskon will vary with the temperature used in molding, a wide variation of permissible steam pressures being usable. Excellent cures may be obtained at less than one minute at high temperatures, but it is evident to the molder that plasticity will be of less duration at these high temperatures and that, if the piece requires a long or complicated flow, the temperature of the mold must be lowered to give the material time to fill the mold before the hardening or curing action has progressed to such an extent that pressure is no longer sufficient to close the mold. Also, it is true that, where heavy cross-sections are encountered, lower temperature must be employed in order to prevent a case-hardening action.

While still in the developmental stage, the need for preforming or briquetting became very evident as this operation seems destined to play an increasingly important part in molding. With this requirement in mind, a method has been developed for producing a material that can be preformed regularly in any standard machine. Preforming has proved to be a great boon in handling light colors because the chances of dirt contamination are reduced to a minimum and handling in the press room

is greatly simplified; then, too, in most cases, improved flow and elimination of breathing result from preforming.

A proper degree of cure is much more important with urea resins than with the better-known phenol compounds. This is explained by the fact that urea resins are originally water-soluble and, in the molding and curing operations, they must become practically insoluble in water inasmuch as they are necessarily exposed to some moisture, even though it is only the water content of the air. Phenol resins, on the other hand, seldom come in contact with their best solvents, for example, acetone, so a lower degree of cure is permissible. Speed of cure in Plaskon has been carried as far as molding equipment will permit in order to minimize the possibility of under-cure.

### Water Resistance

Boiling in water seems to be the most practical test of the degree of cure; but here a distinction should be drawn between articles which will be exposed only to atmospheric moisture and those which will be subjected in use to direct and frequent contact with water. A switch plate or a closure will serve to illustrate the first category, while a tumbler or button falls into the latter class. For the first, five minutes in boiling water should be an ample test. The piece should show no loss in surface luster after boiling, nor should it develop chalky white streaks twenty-four hours later. For articles in the second class (frequently exposed to water in use), a more drastic test is required. Such a piece should be weighed, boiled fifteen minutes, dropped into cold water for a few minutes, dried, and then reweighed. The increase in weight (i. e., water absorption) should not be more than 0.02 gram per square inch of exposed surface. This absorption should be stated in relation to

(Continued on page 687)

# Modern Construction of Machinery For the Plastics Manufacturer

By *Evarts G. Loomis*

*Evarts G. Loomis Company*

**N**OW that the worst of the period of business inactivity seems to be past, there appears to be an outlook of increasing active business and the great question in many minds is, how to proceed.

By the greatest authorities on such subjects and as shown in past similar periods, the World in the next few years should be on its way up the hill towards great prosperity. Every manufacturer should now be preparing to attract all the orders possible and when they arrive, be prepared to fill them promptly with products of such a nature that they will bring in all possible repeat orders.

During this "slump" many of the leading industries have been utilizing it as an opportunity for improving their plant equipment, methods, etc., to enable them to have a handicap in the competition which necessarily will bring them in the greatest results when the new and improved opportunities arrive.

It would certainly be advisable now for every manufacturer to make a study of their complete line of equipment and investigate if it cannot be greatly improved, changed, or added to, after comparing it with all the types and improvements which have been developed and brought out up to the present time.

In the production of plastics, there certainly have been remarkable new sources of improved types and qualities of materials and tremendous demands which are rapidly being developed. Those who are preparing to handle this business

with the latest and most approved processes, machinery and devices, have marvelous opportunities before them.

Up until recent years, plastics such as celluloid, Bakelite, casein, etc., were used largely as imitations of ivory, ebony, bone, tortoise shell, amber, mother of pearl and others of the finer materials of nature for making toilet articles, billiard and pool balls, collars and cuffs, trays, knobs and handles, dice, typewriter and piano keys, pipe bits, flexible transparent sheets for auto windows, stationery, filing, desk requirements, photo coverings, toys, rattles, and for many other purposes. But as is evident, these were practically all for small articles of many varied colors and combinations and were produced from sheets, tubing or rods of one or more standardized sizes or lengths, different thicknesses and diameters, and in comparatively small and varied lots.

## **The Ever-Widening Field For Plastics**

At present, however, the trend is rapidly advancing for the use of plastics to replace wood, metal, hard rubber, linoleum, glass, marble, etc., in vast fields where the demands are unlimited and from a manufacturer's standpoint, the requirements are quite different. This trend is also well marked for the use of plastic materials in automobiles, office buildings, hotels, theatres as well as apartments and private houses, in their construction, fittings and furniture. What boundless opportunities exist but how different are the demands in quantities and

qualities! Many new plastic lines are being developed and put on the market which means that there must be great additions, changes and improvements in the plants' equipment and machinery.

There are great, new problems presented to the engineers for providing suitable and adaptable machinery for meeting promptly, efficiently and economically these requirements.

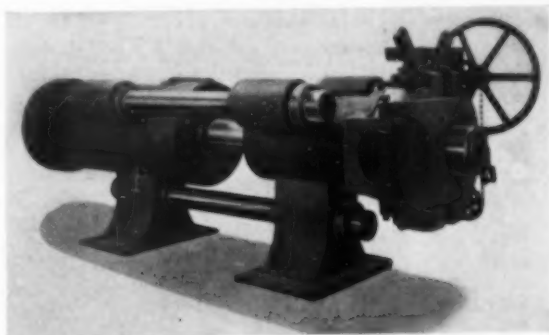
The points in machinery selection which are important, are efficiency in labor saving, productive capacity and quality, maintenance and durability. The essential feature is no longer the initial cost per machine, but the comparative cost per annum of machines completely installed, operated and maintained, divided by its output. A machine should be designed by engineers who cannot only figure the strength of materials, gear teeth, size of bearings, etc. as given in any recognized mechanical engineers' handbook, but he should be intimate with the physical and chemical nature of the material to be handled. He should be well informed regarding the important characteristics and requirements of each class of material, and should be capable of selecting the most available, convenient, economical sources of power for operating the machine in each case.

One of the greatest fields now in view for nitrocellulose sheets, is its use in safety glass and owing to the very particular and important necessity of permanent transparency, chemical and physical purity, also the great range of sizes of very uniform

thickness, the essential requirements of today differ widely from those of the past in a celluloid plant. It is evident that new improved and simplified processes and machines will be of great advantage. Much time, effort and expense is now being spent towards developments to meet these demands.

Now that cellulose acetate is being greatly improved and has special advantages for films, sheets and moulded articles for various, particular uses, together with the fact that it may be combined with other materials and moulded very rapidly, new machinery is needed to enable producers to take advantage of these desired features. For proper designing of machinery to efficiently handle this product also the various phenol and other plastics, much chemical experience has to be combined with the mechanical. The selection of materials for use in the construction of the equipment can only be made after considerable experience in solving the numeral problems involved. For each part of a machine, whether a receptacle, blade, mould, die or whatever it is, should iron, steel, brass, bronze, copper, chromium, alloys, castings, plate, ply-metal or plated surfaces be used to best advantage and where should these materials be obtained to be dependable.

Figure 2. Hydraulic Extruding Press for forming Rods and Special Shapes out of plastic materials.

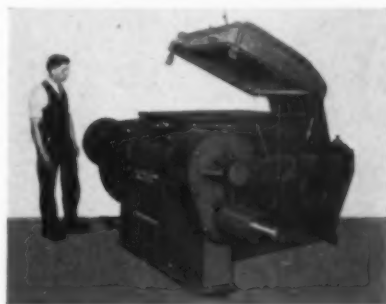


### Filtration

Purity is one of the dominant requirements for most plastic materials. This is accomplished by filtration which not only improves the appearance of the material, but adds strength due to the fine grain and uniformity. In old methods it has always been considered necessary to dissolve the material or reduce it to a liquid form by heat or other means and have it flow by gravity or pressure through cloth or some other filtering medium. This necessarily involves quite a little expense in solvents and operations which can be greatly reduced by forcing the undissolved plastic under high pressures ranging from 2,000 to 10,000 lbs. per square inch through the filter medium. This operation is carried on in a hydraulic filter press. The vertical hydraulic type with two material cylinders which is used to advantage for gums, resins, cellulose acetate, cellulose nitrate, etc. There are usually many serious problems involved which have to be solved in the design of such machines and in each case are given careful consideration by the manufacturers.

One of the great problems in

Figure 1. A modern vacuum mixer used in compounding dough-like plastic masses.



the manufacture of plastics and many other lines is a mixing machine, which can be closed and a vacuum applied while in operation without any discoloration or dirt, rust, particles of metal contaminating the product. Figure 1 illustrates a recent type of this machine which overcomes many disadvantages of the former types, it is now generally considered one of the strongest and most durable vacuum mixers available consuming the minimum power in operation.

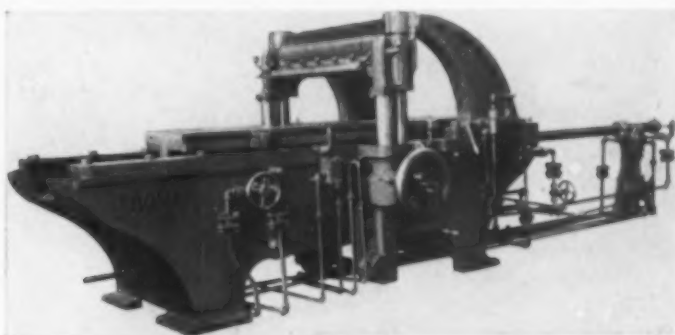
### Rolls and Banbury Mixers

In most plastic fields, rolls or Banbury mixers are essential, and are especially important in the nitrocellulose, special lacquer and similar lines. The Farl rolls now furnished have many new provisions for overcoming former manufacturing difficulties, and for safety as well. The chrome plated rolls do away with discoloration and improve the purity of the product very successfully. These improvements are carefully explained and illustrated in an article on the Banbury mixer written by Mr. Schnuck appearing elsewhere in this issue.

### Extruding Presses

One very valuable machine that is becoming more and more popular with the various plastic manufacturers, is the extruding press, as illustrated in Figure 2. Wherever a plastic material can be adapted to properties which will enable it to be

Figure 3. Hydraulic Sheeter cuts sheets from cake of plastic material. Used in pyroxylin and cellulose acetate production.



extruded, great savings can be made in the production of rods, tubes and various shapes. The machine as illustrated, shows one of the modern type extruding presses and is equipped with a heat controlled material cylinder in which the material is placed and the pressure is applied by a hydraulic cylinder located behind the material cylinder. The machine can be designed so as to enable the applications of desired pressures for various grades of material. The extruding dies or nozzles are mounted in the die holder in front of the material cylinder, which in turn is carried on the door mechanism as shown. This enables the operator to open or close the front end of the material cylinder without handling heavy parts.

#### Sheeters

For most purposes for sheets of plastic materials, ranging over the thickness of film and where accuracy and economy of production are important, the sheeting machine of the type shown in Figure 3 is considered the most useful. During recent years one very important requirement of both consumer and manufacturer is accuracy in the thickness of the sheets. The earlier types of sheeters were made from old metal planers and gave a great deal of trouble, operated very slowly, were extremely inaccurate and were very expensive to maintain. From the driving belts resulted considerable dirt from particles of leather, oil from bearings, and slipping of clutches caused much trouble. The maximum speed from these old machines was about three sheets of material cut per minute. The latest and most improved type of machine as shown, is hydraulically driven and can be readily run at any speed desired for the safety and convenience of the operator. It has actually been run up to from 10 to 14 sheets per minute, though about 8 to 10 is more common practice for the thinner sheets. Concerning

the knife, the feed screws are operated on the return stroke and during this stroke the knife is raised and, on the cutting stroke is not affected by any play or wear, being clamped rigidly in position. The cross-head bearing parts have extraordinarily hard ground and polished vertical surfaces with effective lubrication and no possibility of tilting. The feed screws are directly under the knife at both ends, totally enclosed and efficiently lubricated. They are operated during the return stroke when free from all wear due to pressure or resistance, as the crosshead is raised from them by hydraulic means while they are in motion. Hence a great degree of accuracy, no

appreciable wear and very low maintenance cost results.

#### Looking Forward

Much work has been and is being done on developing the production of endless sheets, rods, powder or granulated materials, also shaping and pressing small and very large articles from buttons, fountain pens, tooth brush handles, etc., up to bedsteads, floor coverings or wall panels.

What tremendous future opportunities there lies for wide awake plastic manufacturers, if great care is used in selecting the proper design of machinery incorporating the most advanced methods.



### Plastics at the Hotel Exposition

**P**LASTICS held a prominent place at the recent National Hotel Exposition at the Grand Central Palace in New York City. Material manufacturers exhibiting were the Marblette Corp. and Formica Insulation Co. Other companies featured products in which plastic materials are used.

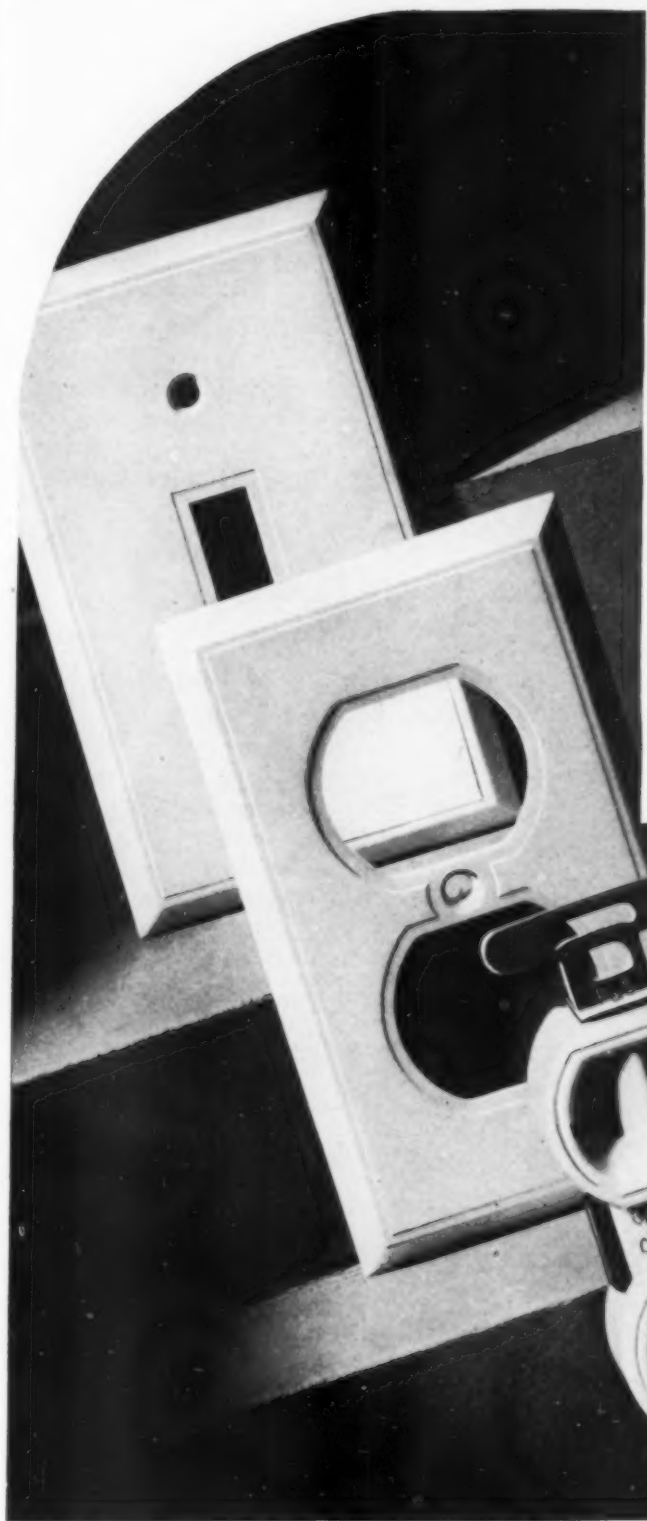
Marblette's booth, with its many applications of that beautiful plastic solid, had many enthusiastic visitors. Outstanding was the toilet seat that had been in eighteen months hotel service without any marring of the surface. Shower sprays, faucet handles, towel racks, cutlery handles made for Federal

Stainless Steel Co., lamp bases and smokers accessories were of interest to hotel executives.

Formica's display featured their well-known laminated plastic trays, panels and floor tiles. Benedict Mfg. Co. showed their line of new Beetle molded soda fountain service as well as the better known line of ice cream scoops fitted with colorful Bakelite handles. The Adjustable Caster Co. showed their line of casters and glides with molded wheels and glides. These casters have a patented height-adjustable feature. Several urn and fountain heater manufacturers showed products with plastic knobs and handles.

#### PLASTICS & MOLDED PRODUCTS

# "Beetle's" Invasion is Moving Fast . . . Now It's Sweeping Into the Electrical Field



Today, "Beetle" molded convenience outlets and switch plates are adding a new note of softness and color harmony to smartly decorated homes. The development of the lower-priced "Beetle 212" Powder in a full range of colors opens new sales opportunities for custom molders in the electrical field.

Among the outstanding pieces are the switch plates and convenience outlets designed by Pass and Seymour, Inc., of Syracuse, and molded for them by the Auburn Button Works, of Auburn. They present an excellence of detail, clearly and accurately produced in "Beetle 212" of a soft ivory shade.

"Beetle 212" is available in ten striking colors and lovely pastel shades. Its remarkably low price has stimulated its rapid adoption to a wide range of molded products.

"Beetle 212" does not require stainless steel or chromium plated molds. Moldings of it are light, strong, dielectric, waterproof, non absorbent and non-inflammable. It can be tabletted and will take the same molding cycles as the black phenolic powders.

We will be glad to supply you with complete information, color samples and specimens of recent "Beetle" moldings.

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# Pumps and Accumulators for Plastic Molding

By W. F. Lent

Cutler-Hammer, Inc.

**T**HE plastic industry requires in the pressing operation, means for providing great pressures at short strokes. While for specialized applications mechanical means for producing these pressures in toggle, cam or rack-operated presses have successfully been provided, in general no method as simple and as inexpensive as the hydraulic method has been devised. The principle of the hydraulic press is well known. For mass production a battery of presses can best be provided with hydraulic pressure by means of an hydraulic system. This consists of a pipe line connected to the individual presses by suitable operating valves, a pump or battery of pumps, an accumulator and suitable control means. For many plastic operations a double pressure line is desirable. The low pressure provides means for closing the molds against frictional resistance only and for initial fluxing of the charge in hot molding; the high pressure is used for the final squeeze to fill out all depressions in the

mold. The saving in power by this procedure is obvious and much wear and tear is saved by the graded application of first low and then high pressure. In practice the low pressure ranges from 200 to 500 lbs. per sq. in. and the high from 1500 to 4000 lbs. per sq. in.

## Pumps

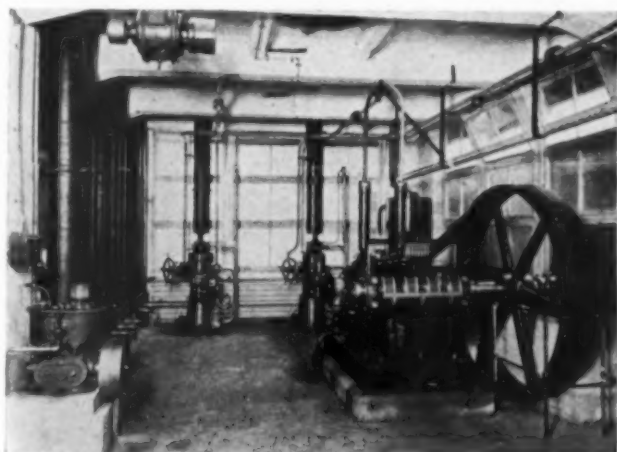
The heart of the hydraulic system is the pump, which delivers the hydraulic medium from a supply tank to the pipe line. The conventional pump is provided with single action plungers, as inside packed double action pistons used in a reciprocating steam engine, are impractical under these high pressures. As the delivery of a single plunger is pulsating with sinusoidal characteristics, a number of plungers in triplex or quadruplex arrangement is provided to smooth out the delivery. The cylinder blocks may be vertical or horizontal. In the larger sizes the crank shaft is electrically driven through helical gears. The well-designed reciprocating pump is characterized

by low piston speeds, ample and accessible packing glands and generous crank and main bearing areas.

A recent development is the radial pump now supplied by two domestic manufacturers and also imported from abroad. As implied by the name, the cylinders are radially disposed and rotate on a pintle carrying the inlet and outlet ports. The plungers are carried on a mechanism which allows a range of stroke from zero to the maximum, thereby providing inherently variable delivery which lends itself readily to various means of control. This control may be linked to the accumulator gradually to stop the pump delivery at the top of the stroke and thereby eliminate the necessity of by-pass valves. These radial pumps operate at high speeds, are compact and the moving parts are fitted so closely that packings are unnecessary. The efficiency is high. On the other hand, the hydraulic medium must have good lubricating value, the construction is more complicated than the conventional pump and when wear occurs it cannot be compensated by taking up packings, and generally necessitates replacement. Radial pumps are built for pressures ranging from 1000 to 2500 lbs. per in.

## Accumulators

The accumulator is provided to give storage capacity to the hydraulic system. This permits pumps to be provided with a capacity equal to the average demand of the presses. Simultaneous operation of a number of large presses when beyond the pump capacity then draws



Typical hydro-pneumatic accumulator and pump installation used in plastic molding.

on the reserve in the accumulator. The conventional accumulator consists of a stationary vertical cylinder equipped with a packing and a ram carrying weights of cast iron, concrete, or in the form of a tank to receive steel scrap. As the dead load on such an accumulator in a large system is very great, care must be taken that the maximum demand will not cause too fast a descent of the weights. Under such conditions the kinetic energy developed may well be so great as to wreck the system. Chokers in the accumulator delivery line and spring loaded pistons providing shock absorbers may guard against such a contingency.

As the weight loaded accumulator obviously may produce wide fluctuations and shocks in line pressure, the air loaded or hydro-pneumatic accumulator was developed. This device may operate on relatively low air pressure through a differential piston device or with a one to one ratio calling for an air pressure equal to the hydraulic pressure. In either case, ample air storage capacity must be provided to prevent wide changes in pressures between the full and empty positions. The air accumulator has the additional advantage, against the weighted accumulator, of low weight, enabling installation without heavy foundations—also the operating pressure may easily be changed at will.

#### Control

Except in the case of the variable delivery radial pump, the discharge of the pump is constant. A by-pass is therefore provided which is operated by the moving accumulator ram to cause the pump discharge to be diverted back to the supply tank when the accumulator is full. In double pressure systems two accumulators are provided. Entirely independent high and low pressure pumps may be provided, each controlled by its corresponding accumulator. Or the by-pass of the high pressure

pump may discharge into the low pressure accumulator whose own by-pass will divert the discharge into the supply tank when both accumulators are full. In this way a double pressure system may be operated with one pump.

Especially with the weighted

accumulator, safety devices to cut off power and eventually to discharge the pressure must be provided to prevent accidental overtravel of the ram causing the ram to emerge from the cylinder and the weights to topple off.

## Modern Display Rooms for Pyralin in New Empire State Building

THE extensive new showrooms of the Du Pont Viscoloid Company in its new quarters in the Empire State Building, New York City, mark a definite advance in more modern methods of display. The plans were so arranged that the main showroom could be seen at a glance upon entering, while glimpses could also be had of a number of semi-private sales spaces for the display of the different types of merchandise.

The cases, made of genuine American walnut with applied chromium metal bands, are set off in island fashion, the ones in the middle of the floor being approximately eye-level height and those against the wall about seven feet high. The interiors of the cabinets are of maple and form a decided contrast to the dark exterior. Maple edged with walnut has also been used for the shelves, which are of a tilting and adjustable type. The lighting is entirely concealed

and of an indirect nature. This, with the blending and combination of the woods and metals, produces a soft and mellow background for the display of merchandise.

An ivory buff color was selected for the exposed walls of the rooms, to act as a background for the walnut fixtures. The color scheme is further carried out by horizontal-striped window hangings, consisting of a formal side drape.

The plans and designs were created especially for the Du Pont Viscoloid Company under the supervision of Mr. John D. Rybakoff, and were executed by the Sterling Cabinet Company, Inc., an affiliated company of the John D. Rybakoff Company, Inc. While it was especially designed for incorporation in the Empire State Building, it is said to be one that would fit into practically any building, either old or modern.

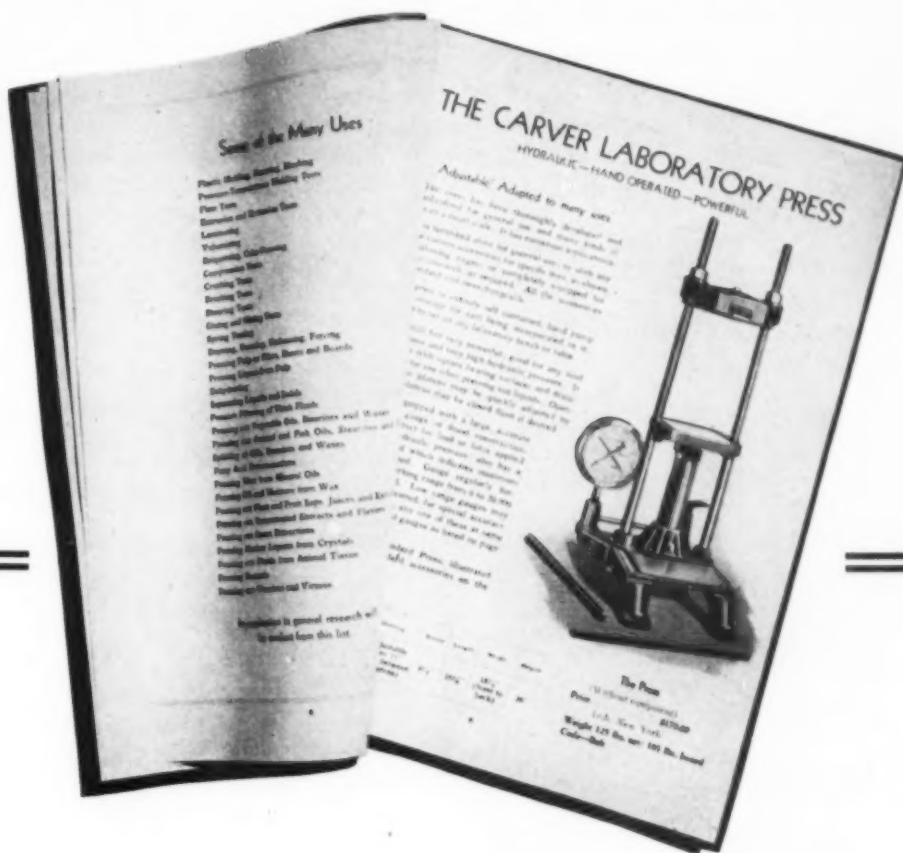


Du Pont Viscoloid showrooms are as much the last word, in display, as is the building which houses them, in height.

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# Good Molds Require Proper Steels

Modern Metallurgy Has Provided the Toolmaker  
With a Number of Alloys for Plastic Molding Purposes

By John Hohl

Newark Die Company

IT is needless to state that the most important item in mold construction is the selection of a proper steel. No matter how excellently a mold is designed or how precise the workmanship, unless the proper steel, correctly heat-treated, is used, the mold is certain to fail in service and result in loss of production.

The stresses involved in plastic molding are of such manifold and complex nature that they are very difficult to define. It is equally impossible to assert that any particular steel is suitable for all purposes, because experience teaches that each type or grade of steel must be chosen for the specific purpose it is intended to serve.

## New Standards

In years past, the selection of a steel was confined almost entirely to carbon steel. However, with the demand for an improved product for use in complicated molds, the steel producers have developed various types of steel which are superior in many respects. This is especially true of alloy steels and it is largely due to their development that many intricate mold parts, formerly considered impractical, are now possible of attainment with every assurance they will give satisfactory service.

In selecting a suitable steel a practical method has been to subject the steel to stresses similar to those in a mold under pressure. Each specimen is machined to standard dimensions, heat-treated to the same hardness of the mold part, and subjected to pressure until crushed. While this is only a comparative test the results obtained have been quite satisfactory.

## Crushing Loads—Specimen Tests

No.	1	100,000 lbs.
	2	120,000 "
	3	160,000 "
	4	160,000 "
	5	180,000 "
	7	190,000 "
	10	200,000 "
	11	200,000 "
	12	200,000 "
	13	200,000 "
	14	220,000 "
	15	260,000 "
	16	280,000 "
	17	280,000 "
	18	280,000 "
	19	300,000 "
	20	300,000 "
	21	350,000 "

These tests would indicate that while a steel may be most satisfactory for cutting dies, they are not suitable for molds.

Non-shrinkable and non-warping oil hardening steels are ideal where accuracy and close dimensional limits are of vital importance. This ideal condition however is attained by a decrease in tensile strength and metallurgists have still to perfect a steel which can be heat-treated with very slight distortion or warping and retain a high tensile strength and elastic limit.

S.A.E. and Chrome Vanadium alloys are ideal where thin cross sections of a mold are subjected to high unit stresses. The factor of shrinkage or warping, when heat-treated must be taken into consideration.

Stainless steel is used when the molding material has a corrosive action on the steel. It usually contains 14 to 18% chromium. In some cases this chromium content is not sufficient to prevent corrosion and

the mold parts are then chromium plated to a thickness varying from .0002 to .002.

For many years a source of annoyance and increased cost in mold construction has been due to hardening large, thin plates. The distortion occurring has necessitated grinding and lapping operations increasing the cost of the mold far beyond the estimated cost.

This difficulty is now being solved by the introduction of Nitralloy steel. This is an alloy steel having various carbon contents, together with approximately 1.0 per cent aluminum, 1.0 per cent chromium and 0.2 per cent molybdenum. It is heat-treated by subjecting it to the action of hot ammonia gases for a period up to 90 hours for a penetration of .031 inch. Since in this process the heat must be raised to a temperature of only 900 to 1100 degrees F. and the steel is allowed to cool without subsequent quenching, the distortion occurring is at a minimum providing the strains previously produced in machining have been removed by normalizing treatment.

## Heat Treatment

This steel has great future possibilities in mold construction when once the necessary special heat-treating equipment becomes more generally available. The only serious drawback at present to its general use is the long time required for treating.

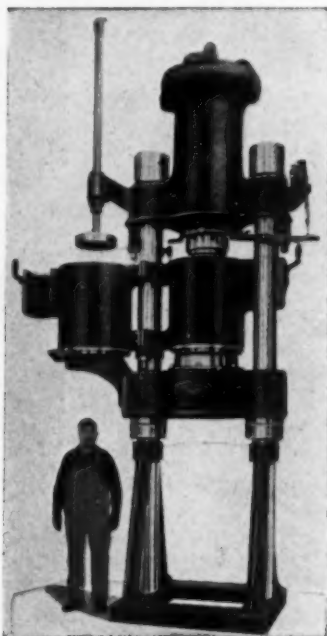
Imagine if you can the reaction of a mold purchaser, on being informed that the mold is all finished except hardening

(Continued on page 699)

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## Banbury Mixers

First developed for the rubber industry, where its use is now practically universal, the Banbury Mixer has been found to be adapted to many applications in the plastics field, including asphalt composition products,

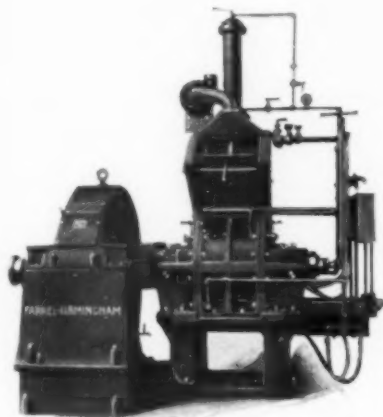


Fig. 1—Size 3-A Banbury Mixer with Individual Motor Drive.

asphalt tile, linoleum, roofing material, bakelite, shellac record stocks, resinous compounds, phenolic condensation products, pre-mix, etc.

The Banbury lends itself admirably to a great many forms of mixing where it is desired to retain the material in the chamber and apply an intensive mixing or smearing action on a resistant material. The full field has not as yet been developed, since new uses are constantly being found whereby a previously difficult or expensive operation is cheaply and easily done in the Banbury.

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The machine shown in figure 1 is the size 3-A. Descriptive literature covering the full range of sizes will be sent on request. For special stocks a full size test machine is available at our Derby plant to determine quality and quantity of output of the mixed material.

## Roll Mills

Farrel-Birmingham Roll Mills are widely used for various operations in the working of plastics, such as linoleum, celluloid, bakelite, caseins, synthetic resins, pyroxlin base lacquers, etc. They are equipped with Farrel-Birmingham hard, chilled iron rolls, famous in many industries for their superior quality, precision and durability. The Mills are properly proportioned as to weight and rigidity, of modern design, and fitted with attachments suitable for their particular function.

Figure 2 illustrates a 22" x 60" Celluloid Sheeting Mill equipped with Farrel-Sykes gear reduction for motor drive, and controlled by pneumatic clutch brake. The latter provides for quick stopping in case of emergency, as well as for service operation. For service operation, the control is so designed that the rolls are stopped gently and without strain,

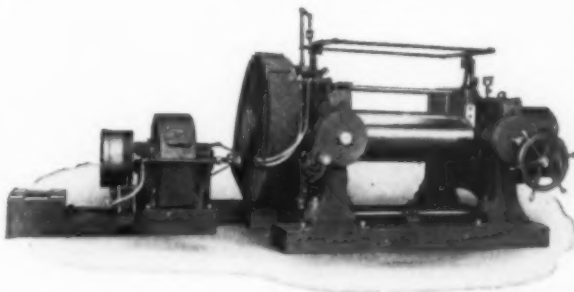


Fig. 2—22" x 60" Celluloid Sheeting Mill with Farrel-Sykes Gear Reduction and Pneumatic Clutch Brake.

and is located for convenient operation from the front of the machine. Used as a safety device, the pneumatic clutch brake is quick and positive,

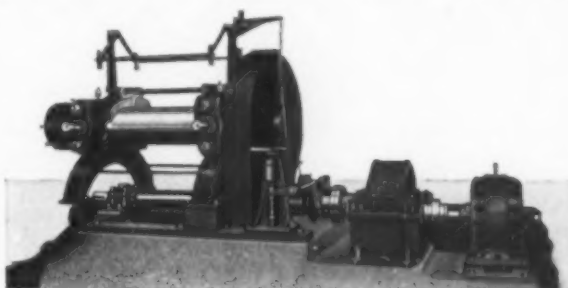


Fig. 3—16" x 42" Mill with Farrel-Sykes Gear Reduction and Coil Clutch.

meeting fully the requirements of the strictest safety code.

Figure 3 is a 16" x 42" Mill, motor driven through a Farrel-Sykes gear reduction and equipped with coil clutch for service operation as well as emergency stopping. The drive and shafting are arranged for the addition of another mill to make a unit of two driven by the same motor.

Farrel-Birmingham Roll Mills are built in a wide range of sizes and designed with any special attachments or equipment to meet any production requirements. Long experience in building heavy machinery for the rubber and plastics industries, combined with a competent engineering staff and modern plant facilities, assures equipment of the highest type, correctly designed for its particular purpose.

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# Production Economy Through Better Preforming of Molding Materials

By *H. M. Buckman*

*Roland G. E. Ullman Co.*

**A**SKED by the Editor of **PLASTICS and MOLDED PRODUCTS** to describe improvements in preforming equipment used by makers of composition products, we shall limit ourselves to those features that are of recent development and which contribute to more economical production or an improved finished product. We shall assume the reader's acceptance of the fundamental fact that preforming saves time and labor and greatly facilitates the molding operation itself, and knowledge of the essentials in the preforming operation.

The industry has been demanding of the makers of its preforming equipment, as well as of the manufacturers of the molding presses themselves, speedier production, trouble-proof operation, a more nearly perfect preform and one that could be fed more rapidly to the molding presses; and it has not asked in vain.

## Elimination of Breakdown

Until recently, one of the most serious problems in the preforming department was the jamming or even breaking of the preform presses, due to overloading the die or to the presence of a portion of a previously made preform or some other foreign substance in the material being compressed. These jams and breakdowns interrupted production and caused exasperating and expensive delays. To meet this problem, the Automatic Excess Pressure Release was developed. By means of a counterweight or spring, all strains are absorbed and overloads spilled without the dis-

ruption of production formerly encountered. This device is now available on both single punch and rotary model preforming presses.

It is obvious that the finished product will be improved and the number of imperfect pieces reduced to a minimum if the accuracy of the weight and uniformity in density of the preforms are constantly maintained. These objectives are reached by the use of the rotary preform press, the importance of which, for this and other reasons mentioned later, is increasing in the preforming field. This press obtains accuracy of weight by overfilling the die and scraping off excess material, and secures uniformity in density by applying the compressing pressure as a slow squeeze simultaneously from both sides of the piece, giving the same hardness on this type press, to both top and bottom of the preform.

Great gains have been made in the output of the preform

press by use of the rotary machine which has, in turn, reduced production costs. Machines are now available which will regularly produce 200 to 300 preforms per minute, and some models can be speeded up to 600 or 700.

## Ball Preforms

Production on the finished product, however, has been facilitated in another way besides simply speeding up the output of the preform presses, namely, by designing a press that would turn out preforms of a wide variety of shapes, particularly the ball shape which, in turn, can be loaded more rapidly into the hot presses because of their shape—in some cases even being fed by gravity to the molding press. Some users are taking advantage of the accuracy and ease of handling of the ball preform to the extent of loading as many as five or seven balls as one charge for each cavity of the molding press. This shape also offers the pos-

Figure 1.

The development of the rotary preform press has markedly influenced economies in plastic molding. It is exceptionally speedy. 200 to 300 preforms per minute are customary in ordinary production. With special shapes and certain model presses, 600 to 700 pieces per minute have been obtained.

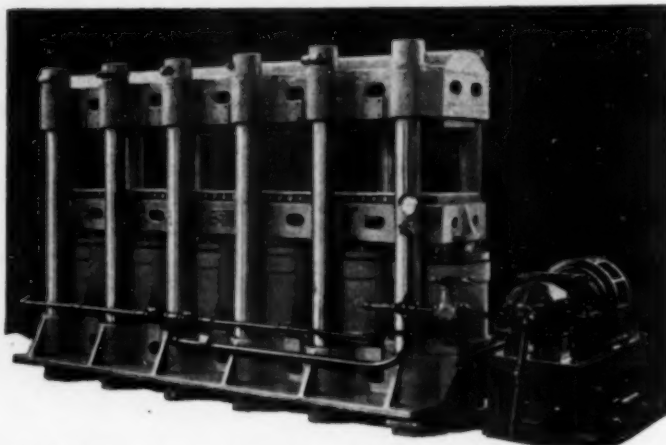
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Figure 2: Preforms are a distinct aid in the use of plastic materials. Capable of being pressed in a variety of forms, they make practical the molding of intricate shapes otherwise very difficult.

Photo Courtesy F. J. Stokes Machine Co.

sibility of preheating the preform while it is rolling to the molding press, thus reducing the length of time in the hot press. These applications of the ball preform naturally save an enormous amount of handling, time and labor.

This so-called "ball preform press" was developed in answer to the specific need of one molder who wanted to maintain a production schedule running into millions of pieces all alike.

Similarly, perforated preforms or those of practically any desired shape, can now be made on a production basis with the "ball" model. For production of bottle tops, tube caps, and the like, the rotary press is indispensable.

The single punch press will always be most satisfactory for general work where production is limited or where a number of special shapes or large-size pieces are involved, because of the cost of the dies. Where large production is desired, however, the advantages of the rotary machine are obvious.

In certain cases, even limited production can be economically handled on the rotary model by operating the press with only as many pairs of punches as the job warrants, other shapes being left set up in the machine with punches out. Thus, the die cost, a factor to be considered, is kept down while the advantages of greater speed, accuracy, and uniformity are obtained.

Mention should be made also of the production problems solved in other fields by the use of the same general type of compressing or tableting machines used in preforming. Figure 2 shows a variety of products including metallic and carbon motor brushes, glass beads for electric light bulbs, porcelain insulators, catalyzer tablets, resistance discs, radio grid leaks and spacer discs, lightning arresters, and the like. Other products besides molding compounds which have been successfully compressed include metallic powders, washing powders, dyestuffs, abrasives, ink powder, chemicals, clay, foods and explosives. The manufacturers of preforming or compressing machines have assembled a vast store of knowledge and experience on the subject and are always glad to experiment with new problems which will lead to a wider application of their equipment.

## Press Equipment for Plastic Molding

### Mass Production and Unit Installations Influence Design of New Molding Presses

**T**HE materials now commercially available to the plastic molding industry require, almost without exception, working pressures of 1500 to 4000 pounds per square inch to be formed into articles. Molding presses which provide these pressures are really the backbone of the plastic molding industry.

Various methods have been devised for exerting the necessary force upon the platens of the press. First, and still most commonly used, is the hydraulic press in which pressure is applied to a ram which transmits the force to platens to which the molds are fastened. Removable molds requiring manual ejection of molded pieces are

slow. This led to the development of the semi-automatic press in which the molds are fixed to the platens and the molded pieces are mechanically ejected after the cycle is completed.

#### Tilting Head Press

While this type of press is still universally used, mass production requirements have been responsible for a number of modifications of the semi-automatic hydraulic press. Most interesting is the tilting head press which was designed to facilitate the setting of metal inserts in the mold. This press opens so that the top die is set in a vertical position entirely clear of the bottom. The long narrow platens first used in the

tilting head press have been used in the newer, improved, semi-automatic presses.

The angle head press was developed for molding where split or three-part molds are required. In this press, force is applied by two rams, horizontal and vertical, and provides the only method for molding a number of split-mold operations.

#### The Duo Press

Many molding materials require chilling under pressure before the parts may be removed from the mold. For economical operation, two presses, one heating and one chilling, are generally used. The Duo press recently developed, is in effect two presses in one, having a heating station at the rear of

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*If it can be molded we can furnish the molds*

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Tilting head press open showing ease of access.



The Duo Press. In effect two presses, one heating and one chilling.

the press, a cooling station at the front, and a table which revolves around a central column for transferring the molds from one station to the other. The heating station consists of an upper stationary steam- or electrically heated platen and a similar lower heated platen which is raised by the main hydraulic ram of the press and lowered by hydraulic pull-backs. When the press is closed at the heating station, the mold is lifted from the revolving table and pressed against the upper heating platen. The mold is thus heated by conduction from the two platens between which it is held. The cooling station is similar to the heating station except that the upper platen is attached to a tilting head which is equipped with jaws for lifting the upper half of the mold.

#### Self-Contained Presses

Where a battery of hydraulic presses is operated, a central pump and accumulator installation is an essential. When just a few presses are set up, the elimination of this expense is a decided advantage. A complete self contained hydraulic unit built into the molding press is a recent development. A motor driven pump having high and low pressure stages is built in-

to the base of the press. When the ram comes to the work, an automatic change valve brings the high pressure stage into action within a few seconds. The usual semi-automatic ejecting devices are included and platens may be steam or electrically heated.

Another type of self-contained unit is the mechanical molding press. One that is used considerably is the rack and pinion arbor press type in which an electric motor operates through a train of gears to a rack pressed into the lower bed. The motion of bed brings into action four powerful springs which

maintain pressure while the molding material contracts during the curing process. This press, too, can be used as a semi-automatic unit and platens may be heated by steam or electrically.

Another newly - developed press has been recently offered the industry. This, however, embodies no novel functions but includes a new departure in construction. Instead of machining the various members from heavy castings, the press is of all fabricated steel-welded construction which, it is said, offers many economies over the older method.

#### A New Testing Instrument

A new instrument adapted to use in a wide variety of industries has just been placed on the market in the United States and Canada by the R. Y. Ferner Company, Washington, D. C. It is called the Duroskop and is primarily a hardness tester but one depending on the dynamic principle of a falling pendulum rather than on static tests of the usual hardness instrument. It is therefore also a measure of resilience and can be applied to such materials as

molded and laminated plastics, vulcanized fiber, rubber, paper board, wood, graphite, sole leather, ceramics, cement blocks and tiles, linoleum and similar floor coverings, in addition to all kinds of metals.

One value in the instrument lies in its portability in that it can be taken to the pieces to be tested instead of bringing quantities of pieces or samples to the instrument. For this reason also it is not necessary to take samples and any point in the whole piece can readily be checked.



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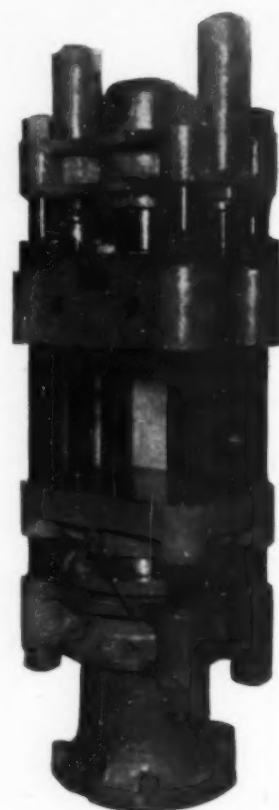
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### Bank Suit Alleges Heming Embezzlement

**T**HE Hartford Courant in an Associated Press dispatch of November 12, states that suit for \$50,000.00 has been filed in the Bridgeport Superior Court by the Merchants Bank & Trust Company, of Norwalk, Connecticut, against the Hartford Accident and Indemnity Company, for losses sustained through the alleged misappropriation of funds by Emil Heming, former president of the bank, who was bonded for that sum by the insurance company.

The 30 page complaint filed by State's Attorney Comley, cites eleven counts of misappropriation, declaring that the bank, formerly the Central Fairfield Trust Company, sustained losses of \$85,187.63 through Heming's manipulations in transferring to the bank personal stock market losses. The writ declares that Mr. Heming, as head of the bank, made an unauthorized and unsecured loan of \$4,500 to Nina B. Heming to secure funds for his own use. Other counts involve similar manipulations to Nina Heming, A. F. Young and Emil Barth.

The former Central Fairfield Trust Company was closed about a year ago by order of the State Bank Commissioner. The Bridgeport First National Bank, as receiver, re-organized it under its present name eight months ago. Mr. Heming resigned as president after the closing of the bank, and moved to New York. He is well known in the plastic industry as the author of the book "Plastics and Molded Electrical Insulation", and was at one time president of the American Insulator Corp., when that company was located in Danbury, Connecticut. In 1927 he was a member of the Banking Committee of the House of Representatives, being elected from the Norwalk district, and in 1929 he was House Chairman of the committee. Recently, he moved to Newark after organizing the firm of Plastics Industries, Inc.



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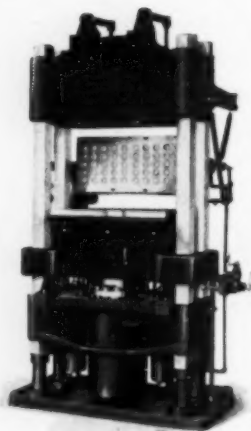
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May we quote prices?

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DIVISION

Auburn Button Works, Inc.  
AUBURN, N. Y.



PLASTICS & MOLDED PRODUCTS

# Plaskon—A New Molding Compound

(Continued from page 665)

surface rather than as a percentage of weight, because the exposed area is the controlling factor. If desired, this high degree of cure can be reached in Plaskon by baking the molding for about eight hours at from 170 degrees to 190 degrees Fahrenheit after the piece has been drawn from the mold, hardened but not perfectly cured.

Plaskon may be molded in ordinary steel dies, there being nothing in the compound which will either stain or corrode nor make chromium plating necessary. Sometimes, however, a light plating will prove to be a good investment because of the higher polish which results and which consequently lowers the cost of finishing. In nearly all cases, Plaskon can be successfully molded in dies constructed for phenol resins, and only in very rare cases will shrinkage be enough less to make extraction of the piece difficult. Inserts can be handled very readily; but when an extremely heavy layer of Plaskon is to surround the metal piece, care must be taken to attain a high degree of cure. Another interesting and valuable characteristic of Plaskon is its machinability. Tapping, drilling, polishing, buffing, and almost all similar operations may be carried out easily, economically, and without difficulty.

Another point should receive mention in connection with molding Plaskon and other urea resins; this relates to the density of the finished piece. Unless pressure is maintained on the article throughout the time it is in the press, density or specific gravity will be low and no extension of cure time will produce a first-class piece. The cause for this is the too facile escape of the overflow or flash, leaving insufficient material in the mold to absorb the pressure, and, while an apparently complete molding results, its water

absorption will show its defects. This does not mean that full flash molds should not be used, as, in fact, they are entirely practical. Care should be taken in closing, delaying so that too much does not overflow, but it is even more important that as "stiff" a grade of material as possible be employed, rather than extremely free-flowing compounds which escape too readily.

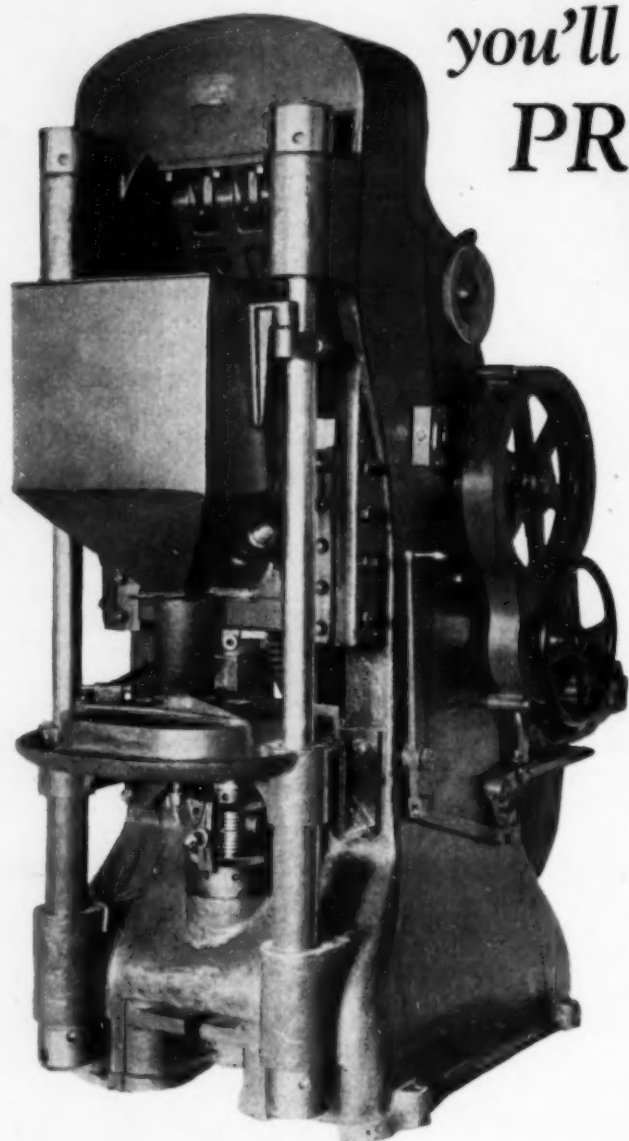
The field for light colored, heat-setting molding compounds is constantly and rapidly widening. Molding of phenolic materials has been largely devoted to mechanical parts where artistic design plays a very secondary part, if it is a factor at all. However, as the use of molding compounds invades the class of articles which are seen and bought by the public, design and color become vitally important, if not **the most important factors**. Manufacturers

are rapidly awakening to the fact that their products must have "eye appeal", if they are to gain public acceptance and purchase. The design and color possibilities of Plaskon forecast its wide use in forms where appearance controls salability.

From a purely esthetic point of view, it is to be hoped that the merits and beauty of Plaskon will obviate the necessity for cheap imitation of woods and marbles, relying rather upon the intrinsic beauty of the material itself. Such creative work in the molding industry, looking to new fields and new applications, will do more to assist the molding trade than will intense competition for long-established lines. The industries today that hold the greatest promise for the coming days of economic revival are those that do not fear to step away from competition and invade fields that are new and unique, offering advantages which competition cannot meet. That way lies the hope of the molding industry.

## Properties of Molded Plaskon

Specific gravity	1.43.
Modulus of rupture	10,000 to 14,000 lbs./sq. in.
Tensile strength	4,000 to 6,000 lbs./sq. in.
Compressive strength	25,000 to 30,000 lbs./sq. in.
Impact strength (Sharpe)	0.7 to 1.2 ft. lbs.
Dielectric constant (25°C.)	5 to 6.
Dielectric strength (puncture)	300 to 400 volts per mil.
Water absorption (20°C.; 1/8" section)	0.07 to 0.66 per cent. in 24 hrs.
Resistance to solvents	Unaffected by alcohol, acetone, oil or other common solvents.
Resistance to acids	Moderately resistant to cold dilute acids. Not resistant to hot or concentrated acids.
Resistance to alkalis	Quite resistant to cold dilute alkalis. Also resists hot, very dilute alkalis, such as soap, borax, cleaners, etc.
Hardness (Mohr scale)	3.0 to 3.5
Hardness (scleroscope)	80 to 95.
Workability	Plaskon can be machined, bored, resurfaced, and polished.



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# Wood-Veneering—A New Use For Phenolic Plastics as an Adhesive

By F. E. Brill

General Plastics, Inc.

WITH the recent announcement of a phenol-formaldehyde resinoid binder for wood-veneering, which cuts processing time from 10-20 hours to a mere 3 minutes, it seems probable that synthetic plastics are establishing themselves in still another industrial field, and threatening to revolutionize completely the methods of laminating plywood in use today. Animal, casein, vegetable and albumin glues have been used up to the present.

The new veneering resins are thermo-setting that is, they require combined heat and pressure before they flux and complete the bond. Naturally this calls for redesigned panel-making equipment. A hot-plate press is used, the resin is sprinkled on in powder form rather than in liquid state usually associated with veneering adhesives. The bond is completed in less than three minutes' time as compared with ten to twenty hours formerly required by clamping processes.

## Elimination of Water

Aside from the great saving in time and production costs, the new synthetic resin bond is said to give many other advantages not obtained with ordinary adhesives. For one thing, the resulting panel is practically 100% water resistant, coming from the press with only 7 to 10% moisture content, and requiring no re-drying. Warping a result of moisture absorption, is eliminated. Naturally, there is no water to soak into the wood during the process, and there is no danger of staining the face veneer no matter how thin a face material may be used. With

the former method of gluing, staining of the face veneer was a constant hazard. Now, there is no limit to the thinness of the plies.

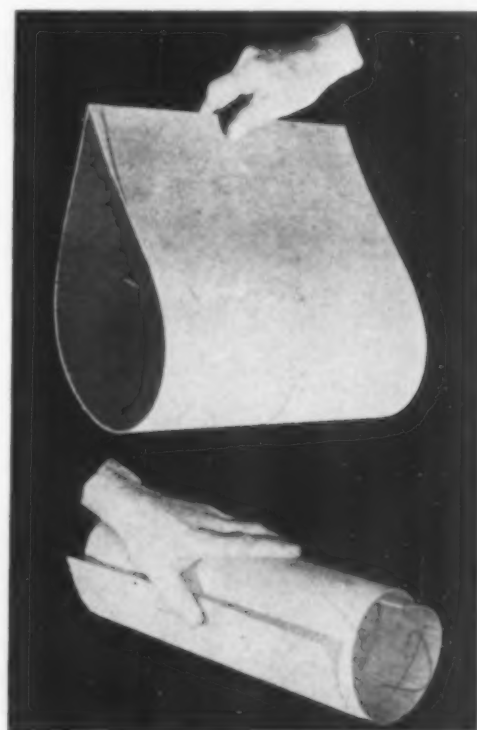
The unusual flexibility of the bond is apparent in the photograph. The top view shows a 42 inch sheet of ordinary airplane plywood bent double, which is a test imposed by most aircraft manufacturers. Below is a sheet of plywood of the same thickness bonded with phenolic resin as the adhesive. The great margin of extra flexibility is an indication of the superior bond.

Results of shear tests are just as dramatic. In both dry and wet tests, the new resin-bonded veneers are said to have shown three to four times the strength of plywood bonded with ordinary glues. New potential markets

such as auto running-boards, heretofore closed to veneers because of water solubility, now open themselves to plywoods made with these moisture-resistant resins. In addition, resin-bonded veneers require no ageing, curing or cooling and can be cut and sawed immediately, thus making for much greater speed throughout the entire manufacturing process. Great uniformity is also reported.

Synthetic resins, of which formaldehyde and phenol are the main ingredients, have long been associated with molding compounds. This application, while the most tangible and dramatic, is by no means their only use. They have been commercially practicable for a little over a dozen years, yet we find them in various forms as paint and varnish ingredients, in lacquers,

Illustration shows relative flexibility of wood veneers bonded in usual manner and with newly-developed phenolic resinoid cement. Above is commonly-used 42" airplane plywood sheet bent double, test imposed by most aircraft manufacturers. Much more severe is test below. Resinoid-bonded plywood can be rolled up as shown without danger of stripping.





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linoleum, insulating varnishes, core-wood impregnation, and a host of other more obscure applications. Used as a binding varnish for paper laminating, we find the finished sheet stock being widely used for refrigerator door strips.

Their adaption to wood-venneering work is a result of research carried on jointly by the Plywood Engineering and Process Company, and General Plastics, Inc., at the plant of the Merritt Engineering and Sales Company, Lockport, N. Y.

### Profits From Sound Prices

(Continued from page 657)

type of press and mold, and cost of depreciated asset values.

There must be a recognition of the community interest in maintaining the molders' equipment at the highest point of efficiency, and the necessity of providing for replacements of costly presses and auxiliary equipment and molds through charges to operations. The sales price of a molded piece must include all items of cost plus a fair margin of profit if the molder is to receive fair compensation for the business risks he assumes.

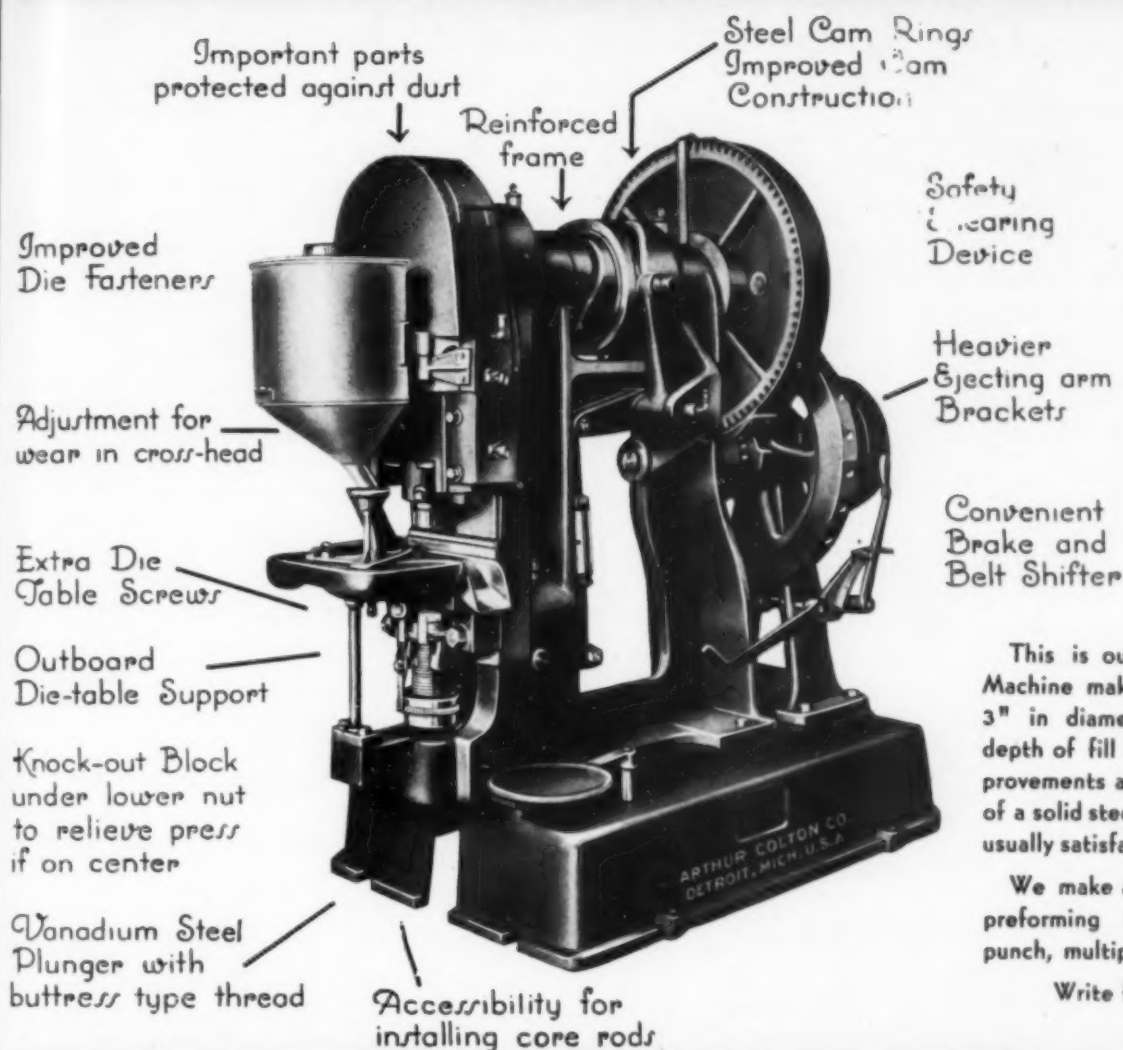
### Synthetic Resins in United States Export Trade

**A**N increased domestic production now permits an expanding exportation of synthetic resin sheets, plates, and manufactures, outgoing shipments during the first 7 months of 1931 representing a 30% value advance over the corresponding 1930 period. Exports of these coal tar resin products go to 28 world markets.

	Year 1930	First 7 Months 1930 1931	
Canada .....	\$88,353	\$44,306	\$64,164
United Kingdom .....	28,096	15,631	36,606
France .....	23,424	17,737	7,054
Italy .....	13,532	5,568	2,182
Germany .....	4,615	1,543	1,076
Australia ..	4,609	4,187	504
Cuba .....	1,591	817	1,062
Mexico .....	258	.....	1,696
Argentina ..	160	.....	966
Japan .....	1,601	287	651
Other Countries ..	7,405	2,337	4,597
	173,644	92,113	120,558

PLASTICS & MOLDED PRODUCTS

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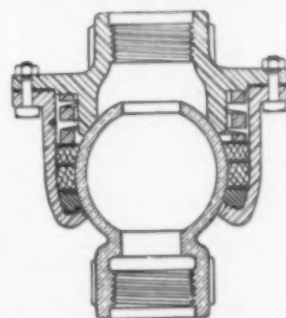
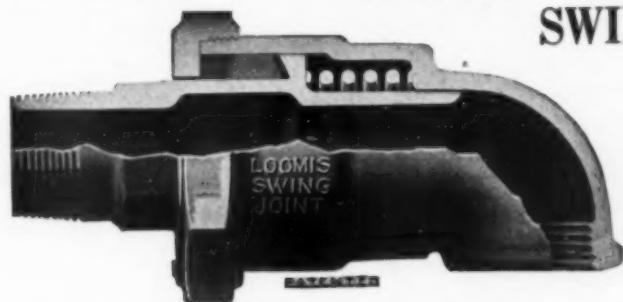
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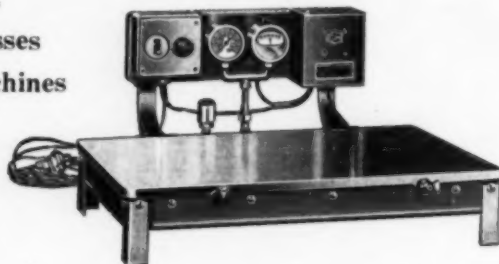
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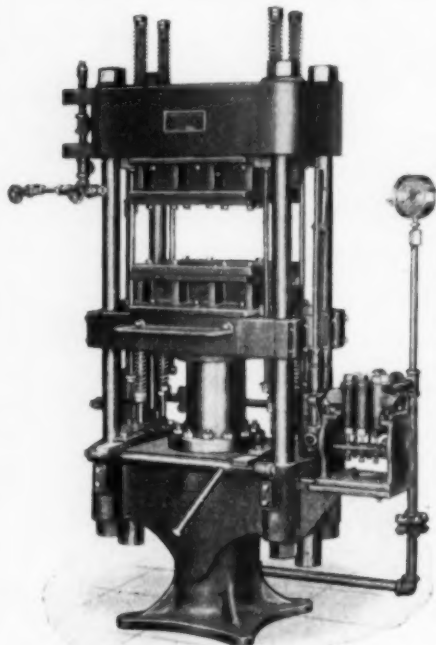
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# Book Review

PLASTISCHE MASSEN, by Ingenieur Otto Manfred (Berlin). A separate from Liesegang's KOLLOID-CHEMISCHE TECHNOLOGIE 2nd ed., pp. 504-536.

A COMPLETE discussion of so broad a topic in 32 pages is hardly to be expected, and the author has therefore wisely given most attention to the particular portion of the field in which he is evidently most experienced, namely the manufacture of horn-like products from casein, which covers about 20 pages apart from drawings of a plant. The other protein plastics, as well as those based on cellulose and synthetic resins, are tersely but succinctly considered. These gel-like masses, very poor in water, may be justly termed *Xerogels* (Wo. Ostwald, *Kolloidzeitschrift*, 46, 254, (1928), just as desert plants are termed *xerophytes*. The term *isocolloid* may be properly applied to those materials where a colloidal phase of one substance is dispersed in the very substance itself; but the term *eucolloid* should be reserved for the optimum dispersion (Schade), or zone of maximum colloidalilty, just as *eutectic*

means the most fusible of a series of alloys.

The technology of casein plastics is divided into: mixing; plasticising; hardening or tanning. Apart from proper choice of plasticising chemicals, it is highly important to give the batch the proper mechanical treatment. It is illuminating to see a skilled technologist stress the importance of kneading and similar mechanical treatment, which cooks and blacksmiths well know is most important, but which ordinary chemical analysis might not appreciate, although the X-ray spectrometer does. The way molecules are assembled often determines the line of demarcation between commercial success and a receiver in bankruptcy.

The final pages, devoted to physical testing methods for plastics, is well worth careful consideration. Foreign, as well as German literature, seems to be fairly shown, and Dr. Manfred is to be thanked for a concise, meaty paper.

Jerome Alexander

## Molding Temperature Control

(Continued from page 660)

devices, however, can only raise or lower the heat energy rate of supply by turning on or off the source of supply. Where cold molds are introduced into operation one must bear in mind that these two media lack the rate of heat transfer possible with steam, due to its latent heat of condensation.

Hand molds and semi-automatic molds, or various types of either, with same temperature applied by the heating media will actually vary as much as 30° to 40° in temperature. Hand pyrometers determine quickly

and relatively accurately the temperature at which a mold is operating. These are a desirable part of the molder's equipment to check actual temperatures and he can set the controls of his heating media accordingly. A very interesting device in the form of a thermocouple has been developed by one concern. This screws right into the mold. An indicator will register, by showing different colors to the operator, whether the mold is too hot or too cold. Such a device can be adjusted according to the desired temperature. If the manufacturer carries out his idea entirely, they may be purchased already set for various ranges of temperatures. This device, when on

the market, will find great favor.

Time, to the average molder, means only one thing, that is, how short a period is necessary for making good pieces. In a good many instances time is only inefficiently measured, by giving the molder sufficient bench work on the same or other jobs to make certain the pieces get a sufficient time under heat. Timing clocks, either alone or operating lights, have been used to improve this condition. Plants have found that rather expensive time control devices paid for themselves in a relatively short time. The device consists of an electric motor operating a train of gears which in turn operates a special hydraulic valve. One gear is notched and by changing this gear the time the press is closed is varied. All the molder does is press a button and the press closes automatically. When the cycle is completed the press in turn opens automatically. Proper safety control is also included.

## Recording Devices

Aside from actually timing the cycles, supervision may be aided materially by the use of recording devices. The simplest is in the form of the cyclo-meter of our bicycling days which is operated by a trip on the press and which counts the number of times a press is opened and closed. A still more efficient device is a small recorder which shows each time the press is opened and closed. At the end of the production day, a study of the chart will show how long the press was opened or closed at any time as well as how often. Such a chart shows clearly how expensive repairs are during the production period. It also gives a practical picture of whether curing time, loading time, or laxity on the part of the operator is responsible for low production over the day's work.

In many instances the properties of the finished piece, aside from appearance and finish, may be greatly improved by molding the proper time at the proper temperature.

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## Bakelite Molding



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Cincinnati, Ohio

## Bates Machine Scores Sales

(Continued from page 659)

serts; and secondly by the Company's placing behind the frame a life-time guarantee against breakage. In other words, the Company agrees to replace without charge any broken frame without time limit.

Not only have the advantages been along the lines of lightness, but another great advantage has been that of finish—not only from the standpoint of the user of the machine, but also from that of the distributor or dealer. Regardless of the care which is exercised in the plating of steel, a nickel-plated finish on machines is likely to tarnish and grow dull in dealers' stocks. This situation is further aggravated if machines are used for display purposes in windows or on the counters; and particularly is this so on machines sent abroad to countries where climatic conditions are severe, such as in the tropics. Bakelite not only will not rust, but it preserves its finish indefinitely without any chance of tarnishing or growing shopworn. Its attractiveness as compared with nickel-plating is obvious, and is in conformity with the trend of the times in getting away from the bright metallic finishes in favor of the neutral shades and colors.

### Trade Reaction

One possible difficulty presented itself in the adoption of Bakelite for use in a numbering machine, namely the general trade reaction to such a move. This point received most careful consideration as it was realized that the step was a drastic one and without precedent and that an unfavorable trade reaction was likely to follow unless the introduction of the machine with Bakelite frame was properly put forward to the trade.

First a most exhaustive test was made of the material covering a period of nearly two years.

PLASTICS & MOLDED PRODUCTS

This not only consisted of factory test but many machines were made up and actually placed in the hands of users where the use of the numbering machine was severe. A monthly check was kept on these machines. Finally the sales force was called into the factory and twenty-five Featherweight Machines were put through an actual dropping test consisting of shoving these machines off an elevated plane, first on linoleum, then on wood, and finally on concrete, from different levels.

In addition to this, certain tests of abuse were carried out, such as nailing up a packing case with two-inch nails hammered in with the Featherweight Machine. Of course some breakage did occur, but the results surprised even the most optimistic and were very convincing to the sales force.

#### The Molded Knob

The Bates Manufacturing Company has not only resorted to the Bakelite frame of their famous numbering machine; but the knob which previously was made of wood and stained, is now also made of Bakelite. Aside from all of the advantages as indicated above, Bakelite in the knob of a numbering machine gives certain qualities of resistance to the acids and moistures of one's hands, which is far preferable to the use of wood or hard rubber or other substances. The casting of threads into the Bakelite offers economies over the machining of same into wooden knobs with added strength against possible breakage in rough usage.

The illustration shows one of the complete line of Bates Machines prepared with this Bakelite frame. This machine is known as the Multiple Movement. The frame is the outer part holding the mechanism, and the knob mounted on top of the handle is depressed by the hand when a number is desired.



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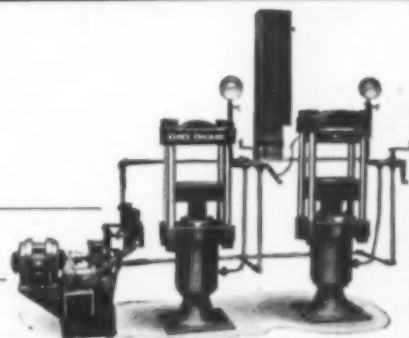
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# TECHNICAL ABSTRACT SECTION

## A Review of Literature and Patents

**Stencil For Copying Purposes.** Max Deseniss, of Hamburg, Germany, Assignor to Alexander Feurich, of Hamburg, Germany. U. S. P. 1,823,260; Sept. 15, 1931.

In the manufacture of the sheet the inventor prepares a solution of 10 grammes of chlorinated caoutchouc in 120 grammes of benzene, and to the said solution adds 25 grammes of a suitable softening medium, such as castor oil, phthalic acid ester or the like and 70 grammes of filling matter such as talcum or zinc white, the said solution being spread on Japan paper. After drying the sheet is ready for use, and it has a high strength against creasing.

It will be understood that the chlorine content of the chlorinated caoutchouc may be varied as desired, it being only necessary to add sufficient softening material to compensate for the amount of chlorine present so that the coating substance may be sufficiently soft to receive the impression of the type or other perforating member.

**Ester Gum.** Leavitt N. Bent, of Holly Oak, Delaware, and Alan C. Johnston, of Kenvil, New Jersey, Assignors to Hercules Powder Company, of Wilmington, Delaware, U. S. P. 1,820,265; Aug. 25, 1931.

320 parts of rosin, which may be desirably a high grade gum rosin or a purified wood rosin, and 35 parts of pentaerythrite are heated under a reflux condenser at a temperature of, for example, 260° C. to 270° C. for a period of about six hours. During the heating air is excluded from the melt by introducing a current of carbon dioxide. By the reaction a clear gum will be formed which will be found to have an acid number of about 30 and a melting point by the drop method of about 101° C.

**Colored Imitation Mother of Pearl.** Amerigo F. Caprio, of Newark, New Jersey, Assignor to Celluloid Corporation. U. S. P. 1,812,283; June 30, 1931.

A colored pearl-like material comprising a transparent binding medium containing particles of the silky lustre variety of lead iodide.

A thermo plastic material comprising a plasticized cellulose compound and silky, shining lead iodide incorporated therein.

A thermo plastic sheet containing the silky variety of lead iodide.

A decorative translucent material formed of a plastic having incorporated therein a finely divided silky variety of lead iodide. There are 7 claims.

**Opaque Washable Playing Card.** Seigfried Klausner, of Vienna, Austria,

and Arthur Eichengrün, of Charlottenburg, and Richard Rohm, of Troisdorf, near Cologne, Germany. U. S. P. 1,811,322; June 23, 1931.

Sheets 0.25 to 0.3 mm. thick can be made by known methods, from nitro-cellulose, cellulose acetate, alkyl cellulose, alkyl-cellulose acetate and similar plastic compositions, by the addition of a mixture of 4 parts of zinc white and 1 part of titanium white; and such sheets will no longer allow light to pass through even from a strong source of illumination.

By adding other mineral pigments, or also soluble colouring matters, these card blanks can be coloured as desired, in lighter or darker tones; they can be easily printed without any need for fixing the impression by subsequent varnishing, and the resulting cards are very difficult to distinguish from those printed on cardboard. They are as opaque as the latter, but are superior in respect of strength (especially resistance to creasing); moreover they are impervious to water and dirt and have the advantage of being less easily torn or buckled.

**Resinous Composition.** Carleton Ellis, of Montclair, New Jersey. U. S. P. 1,811,115; June 23, 1931.

A soluble and fusible sulpho-chlorinated glyceride resin.

A soluble and fusible sulpho-chlorinated, cottonseed fatty acid, phthalic glyceride resin.

The process which comprises heating cottonseed fatty acids, phthalic acid and glycerol together to form an intermediate and reacting on said intermediate with sulphur chloride in an amount not exceeding 4% of the weight of the intermediate.

The process which comprises heating cottonseed fatty acids, phthalic acid and glycerol together to form an intermediate and reacting on a solution of the intermediate with sulphur chloride in an amount not exceeding 4% of the weight of the intermediate.

A sulpho-chlorinated glyceride resin.

A poly-hydric alcohol resin treated with a reactive halide therewith.

A heat hardened sulpho-chlorinated glyceride resin.

The process which comprises forming a poly-hydric alcohol and organic acid resin and reacting on said resin with a halide reactive therewith. There are 21 claims in all.

**Shoe Stiffener.** Albert L. Clapp, of Danvers, Massachusetts, Assignor to Beckwith Manufacturing Company, of Boston, Massachusetts. U. S. P. 1,807,621; June 2, 1931.

A shoe stiffener comprising a felt base including hair or original length, short hair, and insoluble gelatinous material fixed thereto, said base being saturated with thermo-plastic material and cut and skived.

A process which comprises forming a stock containing cellulose fiber, an individualizing agent, and a major portion of hair of original length, beating the stock to effect the combing and individualization of the hair but without substantially reducing its length, running the stock off on a paper machine to produce a porous felt, and filling the pores of the felt with a thermoplastic stiffening material.

**Imitation Pearl.** William G. Lindsay, of Newark, New Jersey, Assignor to Celluloid Corporation. U. S. P. 1,809,449; June 9, 1931.

An artificial pearl essence adapted to product pearly effects comprising a silky, silvery precipitate of mercurous chloride mixed in thick aqueous suspension.

A pearl material comprising a transparent medium containing a finely divided crystalline precipitate of a salt of mercury distributed within said medium and imparting thereto a scintillating and pearly effect, such minute crystals of said precipitate being about 20/1000ths mm. or less in size; said crystals when incorporated in a thermo-plastic mass of a cellulose ester base having their extended faces arranged in substantially one direction.

**Coating Composition Containing Polymerized Divinyl Benzene.** Harry B. Dykstra, of Wilmington, Delaware, Assignor to E. I. Du Pont De Nemours & Company, of Wilmington, Delaware. U. S. P. 1,811,078; June 23, 1931.

A solution containing 200 g. divinyl benzene, 400 g. toluene, and 4 g. benzoyl peroxide was refluxed for four hours and then steam distilled to separate the toluene and unpolymerized divinyl benzene from the polymerized material. The polymer obtained in this way weighed 58 g. and was readily soluble in esters and in aromatic hydrocarbons. The toluene solution of unpolymerized divinyl benzene obtained as a distillate was concentrated somewhat by removing a portion of the toluene, and was then heated for four hours with 3 g. of benzoyl peroxide. When this mixture was steam distilled as before, 52g. additional polymerized divinyl benzene was obtained.

**Condensation and Polymerization Products of Acetylene.** Willy O. Herrmann, Hans Deutsch, and Wolfram Raehnel, of Munich, Germany, Assignors to Consortium Fur Elektrochemische Industrie, of Munich, Germany. U. S. P. 1,810,174; June 16, 1931.

In 900 parts of glacial acetic acid 74 parts of acetate of mercury are dissolved while warming. A solu-

PLASTICS & MOLDED PRODUCTS

tion of 77 parts of benzene sulfonic acid in 100 parts of glacial acetic acid are allowed to flow into this hot liquid while stirring. Acetylene is introduced into the emulsion of mercury benzene sulfonate formed in this way. A rapid absorption of acetylene takes place. On continuing the reaction the liquid becomes thicker. After the absorption of acetylene is finished the reaction mixture is heated for some time at a temperature of from 90° to 100° C. A semi-solid sticky mass is formed from which a resin-like substance is obtained by washing with water. 5 other examples are given.

**Purifying and Decolorizing Rosins With Resorcinol.** Ivan Bubelmann and Clyde O. Henke, of South Milwaukee, Wisconsin, Assignors to The Newport Company, of Carrolsville, Wisconsin. U. S. P. 1,810,170; June 16, 1931.

In the process of purifying and decolorizing rosins, the steps which comprise treating a solvent extraction mass from resinous wood containing rosin, pine oil and other terpenes and a relatively volatile liquid hydrocarbon immiscible with resorcinol at low and ordinary temperatures, with resorcinol, at an elevated temperature, cooling to precipitate the resorcinol containing dissolved impurities and coloring matter and separating the rosin solution from the precipitated resorcinol mass by decantation.

**Preparing of Vinyl Chloride.** Julius A Nieuwland, of Notre Dame, Indiana, Assignor to E. I. Du Pont De Nemours & Company, of Wilmington, Delaware. U. S. P. 1,812,542; June 30, 1931.

The process of preparing vinyl chloride which comprises reacting upon acetylene with hydrochloric acid, in the presence of a cuprous compound.

**Plastic Asphaltic Compositions.** Frederick C. Alsdorf, of Chicago, Illinois. U. S. P. 1,815,089; July 21, 1931.

Mineral aggregate .....	90	to 94%
Asphalt .....	4	to 7%
Liquefier .....	0.4	to 1%
Water .....	1	to 2%
Soap, clay and the like	0.1	to 05%

An improved method of producing asphaltic composition which comprises adding to a cold mix asphalt composition comprising aggregate coated with asphalt fluxed with a liquefier normally used in the art, a small amount of water and an emulsifying agent to produce a partial emulsification only of the asphalt largely on the surfaces of the asphalt coated particles of mineral matter.

**Sulphured Plastic Composition Adapted As a Binder.** Carleton Ellis, of Montclair, New Jersey, Assignor to Ellis-Foster Company. U. S. P. 1,815,615; July 21, 1931.

80 parts of dark colored carnauba wax, 20 parts of ordinary rosin, and 2 parts of sulphur, are melted together at a temperature between 120-125° C., with stirring, for a



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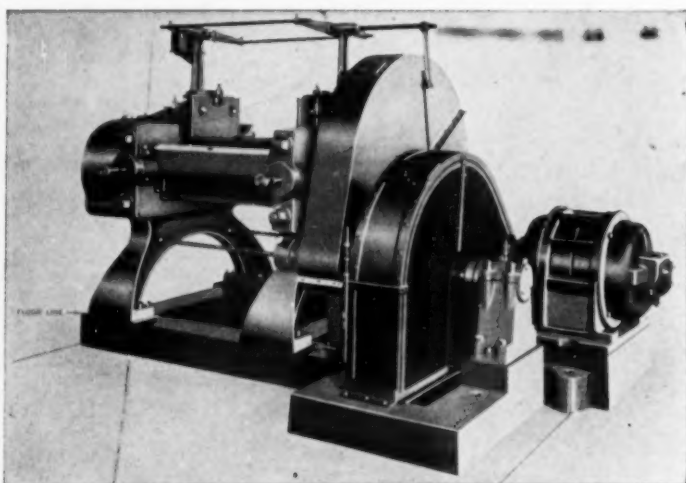
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period of about five minutes, then the mixture is allowed to cool. On comparing this composition with that made from 80 parts of wax and 20 parts of rosin, without any sulphur, it will be observed that the latter is dark in color and slightly translucent, with a decided waxy appearance, whereas the composition containing the sulphur is light in color, opaque and of a less waxy appearance.

A composition may be made from an artificially modified resin, for example, rosin ester, or ester gum, in a similar manner, and the lightening in color resulting on the incorporation of the sulphur, is as a rule, even more pronounced.

Other resins, such as copal, cumaron, damar, and the like, may be incorporated with wax and sulphur in the foregoing, or any other appropriate manner.

A composition containing wax and resin fused with sulphur at a temperature below that at which substantial discoloration takes place.

**Molded Cornstalk Fiber Composition.** Samuel A. Gill, of Ames, Iowa, Assignor of One-Half to Zac D. Dunlap and Harry B. Dunlap, Both of Ames, Iowa. U. S. P. 1,814,751; July 14, 1931.

The process of making compact and homogeneous masses or articles which comprises the dry intermixing of finely divided vegetable and asbestos fiber, the addition to said first mixture of a cellulose binder fluid at normal temperatures, the subsequent addition of a binder retarding agent to said admixture and the final heat treatment of the plastic thus formed under pressure to set the binder and solidify the mass.

**Condensation Product.** Herman Alexander Bruson, of Germantown, Pennsylvania, assignor to Rohm & Haas Co., of Philadelphia. U. S. P. 1,815,886; July 21, 1931.

### Example 1

148 parts phthalic anhydride (1 mole), and 316 parts of 9,10-dihydroxy stearic acid (1 mole), of melting point 125-130° C. are placed in a suitable vessel equipped with a stirrer, and with an exit vent for the water vapor formed in the process, and heated rapidly to 200° C. The mixture is stirred when molten and heating continued for a sufficient length of time, usually 1½ to 3 hours, at 200° C. until a resin having the desired physical properties is obtained. After about 1½ hours heating a plastic, rubber-like mass is formed which dissolves in acetone, butyl acetate, glycol monoethyl ether and other organic solvents. Upon further heating this material at 200° C. it becomes much tougher and insoluble in the common organic solvents. It has a very high tensile strength and is exceedingly elastic; whereas resins prepared from phthalic anhydride and glycerol or ethylene glycol are respectively, hard and brittle or sirupy liquids.

## PLASTICS & MOLDED PRODUCTS

### New Mold-Making Firm

**T**HE Mechanical Die & Tool Co., Inc., was formed on Nov. 16, to take over and operate the Die and Model Division of the Keller Mechanical Engineering Corp., as a separate commercial Die, Mold & Tool works.

The new Company will continue the manufacture of Dies & Molds at the same address, 72 Washington St., Brooklyn, N. Y. where it has been for the past twenty years.

Though the ownership changes, the personnel and equipment remain the same. Mr. B. B. Beck, for many years connected with its activities will be in charge.

The new Company starts with a full equipment of Keller Automatic machines and should prove a help to the many manufacturers of plastics, who find the maintenance of a die department for their needs a burden.

### Mold Steels

*(Continued from page 675)*

which will take 90 hours additional. As an offset to this disadvantage the case of nitrided steel is corrosion proof, extremely hard and takes a high polish resulting in a low coefficient of friction for the molded articles.

Hobbing steels must be selected to obtain greatest elastic limits. Usually steel of a low carbon content is used especially where deep cavities are required. For shallow parts, well annealed carbon, or chromium nickel steel can be employed with satisfactory results.

Metallurgists are constantly seeking to improve their product and what is the best to-day may become obsolete to-morrow. It is therefore absolutely necessary to constantly test new materials. Since the proportion of cost of material to cost of labor is in most cases less than 10%, the price of steel should never be a factor, but rather the quality should be paramount, especially since it results in greater mold life and productivity.

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In the Molding Industry, satisfactory results in the manufacture of plastic articles in heated molds are dependent on the maintenance of mold temperatures within limits dictated by the nature of the material being molded, size of article, and other manufacturing conditions.

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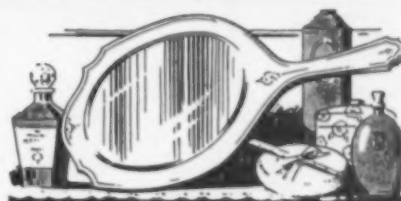
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## And Now, In Closing:

NEMA'S Managing Director, A. W. Berresford, and Assistant to the Director, Alice M. Hopf, are touring Europe . . . don't get excited! They were married on November fourth! . . . that's what we call a real Assistant! . . . We understand that Vinylite will be used on the new R. C. A. Victor records . . . to be called Vitrolac . . . The Norge Corporation, partial to plastics, takes over Alaska Refrigeration Corporation . . . Carl Hart is now Assistant Sales Manager of Parker Pen . . . Financial notes? . . . well, Eastman declares regular dividend plus \$.75 extra on common . . . Continental Diamond reports (nine months) net loss of \$88,983 against net profit (corresponding period) last year of almost half a million . . . Moto Meter has net loss for September quarter of \$86,386 against loss of \$186,826 for third period, 1930 . . . Dow declares regular quarterly . . . Belden a \$.25 quarterly . . . Anchor Cap reports 17.5% net decrease for nine months . . . Had enough? The Fred S. Carver catalog is an innovation in that it gives net prices! . . . The new Durez Mart should be a swell sales tie-up . . . In the molding field we hear of several expansions and a couple of moratoriums . . . and a general decrease in business of around 40% . . . Absolutely, the newest closure application is a line of blue caps for Elise White . . . But the palm must go to McKesson & Robbins, who have a wider range of closure and container plastic applications than any other . . . their new sprinkler tops and Fair-est Vanity case round out the evidence . . . Christmas (pardon us!) is one thing that really is just around the corner . . . We declare our regular dividend of Christmas Greetings and an extra of 1100 . . . for our new subscribers!

ISN'T it about time to do something? Something besides a lot of meetings and a line of talk? At one time, immediately following the general drop in prices, talk was a natural reaction; it ceased to be such when the drop in prices gave way to intentional and malicious price cutting. No branch of the Industry is exempt from its harmful effects or *above, practicing it when the business volume drops to a competitor*. What we need is less wrist-slapping and more hand-cuffing.

Take various molded outlets that used to be considered profitable. Clock cases are more than two-thirds below the price of December, 1929, and have been cut almost 50% in the past year. Tube bases! At 2.2 cents per base how many millions of bases must be sold by a single company to make a few dollars profit? And yet we have been given to understand that a quantity were recently sold for a penny apiece! The largest tube-base molder in the country has estimated that, by trimming all along the line, he could make bases in volume *that he alone is equipped for*, at a minimum cost of 1.3 cents!

This abortive battle has affected everything from closures and buttons to automatic razors and table ware. It has made this Industry—if we can conscientiously call it an Industry—the laughing stock of its customers. "How do they stay in business?" is a question asked by many large buyers, and only those in the Industry can ever guess. A sorry commentary and handicap on that Future that is the Industry's greatest asset!

Personalities and private grudges have played too great a part in the tragedy. We cannot believe that any intelligent man is so ignorant of costs as to quote below the cost of the material alone! Yet that has happened, time and again. Every competitor professes open admiration for the man who develops a new outlet—and then practises his regard by slashing the price, to get the business!

It is time to put a few teeth in the many rules that have been passed. It is time to find a penalty for price-raiding and for the resulting industrial credit collapse—and to enforce the penalty indiscriminately. It is time for every man to find the guts to make his business profitable. It is time for some one to lead a few sheep in the right direction.

PLASTICS calls upon the recognized leaders in the various branches of the Industry to do a little leading. It will take courage and it will take time, but leadership in this will mean leadership in that asset of the Future. If any man has the courage it is time for him to show it; price cutting has become a cowardice.

